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Training Methods Manual for Civil Defense Supervisory and Command Personnel

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USSR REPORT

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TRAINING METHODS MANUAL FOR CIVIL DEFENSE SUPERVISORY AND COMMAND PERSONNEL

Moscow UCHEBNO-METODICHESKOYE POSOBIYE PO PODGOTOVKE RUKOVODYASHCHEGO I KOMANDNO-NACHAL'STVUYUSHCHEGO SOSTAVA GRAZHDANSKOY OBORONY in Russian 1978 signed to press 30 Jun 77, pp 1-168

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CONTENTS PAGE

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[Text] The manual presents overall requirements and recommendations on the organization and methodology for conducting classes with supervisory and command personnel of civil defense. It provides the content of the basic topics of the training curriculum at CD courses of union republics (without an oblast structure) and oblasts (krays, ASSR's) and of the training program for nonmilitarized CD formations.

It is intended for instructors of classes with CD supervisory and command personnel of cities, rayons and national economic installations.

Introduction

The Soviet Union's vigorous foreign policy activity, aimed at ensuring peaceful coexistence of states with different social systems, is having an enormous effect on the entire national situation.

Implementation of the peace program developed by the 24th CPSU Congress and the program of further struggle for peace and international cooperation and for freedom and independence of nations adopted by the 25th CPSU Congress is an object of special concern to the Communist Party and Soviet government.

The historic Conference on Security and Cooperation in Europe of 1975, called at the initiative of the socialist countries, was of substantial importance for establishing the course for detente among states with different social systems. The very fact that this conference was held in Helsinki reflected in the most obvious manner the changes which have occurred on the continent in favor of peace, democracy and socialism.

The conduct and results of the Conference of Communist and Working Parties of Europe held in June 1976 in Berlin were an important contribution to the cause of the struggle for peace, security, cooperation and social progress. But considering that successes in the struggle for peace are accompanied by the stepped-up activity of enemies of detente and the forces of reaction and militarism, which are striving to recreate the "cold war" times and return the world to the policy of balancing on the verge of nuclear

catastrophe, the CPSU CC and Soviet government are devoting proper attention to strengthening our country's defenses and improving its Armed Forces and Civil Defense.

Successful accomplishment of the numerous complex tasks assigned to Civil Defense (CD) depends to a significant extent on the training level of its supervisory and command personnel, the primary missions of whom are:

Thorough study of CD principles and duties of supervisory and command personnel;

Instilling practical skills in planning, organizing and conducting measures for defense of the populace and for increasing the stability of work by installations and sectors of the national economy in wartime, and in organizing and directing the rescue and emergency recovery operations (SNAVR) in centers of destruction (contamination), areas of natural disasters and locations of industrial accidents;

Studying the system of CD training and instilling skills in organizing and conducting integrated installation and command and staff exercises, exercises with nonmilitarized formations, and classes with formation personnel and the populace;

Studying the capabilities of equipment in the inventory of nonmilitarized formations and instilling skills of its proper use in conducting SNAVR;

Instilling moral-psychological steadfastness and confidence in the reliability of methods and means of defense against mass destruction weapons.

The training of supervisory and command personnel is performed primarily right at the national economic installations,* at CD courses, in training institutions for advanced skills, and by independent work.

The success and quality of trainee preparation depends on a proper choice of the methods and forms of training.

The /method of training/ is the work method of the supervisor and trainees. Each training method consists of interrelated elements--training techniques.

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*Subsequently "national economic installtion" will be termed "installation" for brevity.

The following primary training methods are used in training different groups of the populace: explanation, discussion, demonstration, exercise (practice), practical work.

Explanation is the method used for verbal presentation of the provisions of regulations, manuals, guidance documents and the material, technique or action being demonstrated which allows a revelation of their meaning. It usually is combined with other training methods--exercise and demonstration.

The discussion is the method used for systemizing, deepening and reinforcing the trainees' knowledge. It is combined with the explanation and a demonstration of visual aids.

The demonstration is a training method based on exemplary performance of a technique or action or the showing of films or other visual aids. It may be accompanied by a brief explanation.

The exercise (practice) is a method of multiple repetition by trainees of one and the same techniques (methods) and actions performed to achieve high expertise.

Practical work is a training method used for improving the trainees' knowledge and skills in performing their functional duties as part of CD control entities and formations.

The /form of training/ is an expression of the organizational aspect of training. It covers the composition and category of trainees, class structure, place and duration of classes, logistical support, and the role of instructor and trainees in the class process.

The most widespread training forms are group classroom activities, practical classes, group exercises, special tactical problems, staff practices, command and staff exercises, special tactical exercises, and integrated installation exercises.

The group classroom activity allows employing different methods in the course of one class (explanation, demonstration, discussion, exercise and so on) with the use of visual aids.

The practical class helps reinforce the trainees' theoretical knowledge and their development of practical skills in planning and conducting CD activities, using individual and collective protective gear, and working with instruments and special equipment.

The group exercise is a form of training command personnel on the terrain, on maps and on terrain models, with all trainees acting the part of one specific appointment.

The special tactical problem is used in special training of CD formations. Here the teams and groups are made cohesive and matters of their coordination are worked out. It is held against a specific tactical background, usually in training compounds or in full-scale sectors. Operating techniques and methods first are practiced by the elements, and then as a complex within limits of established norms. Command personnel improve skills in controlling subordinates' actions in the problem.

Staff practice is a form of training for workers of CD staffs and services and for command personnel of CD formations. It usually is held on maps or diagrams by the exercise (practice) method.

The command and staff exercise (KShU) is a form of joint training for supervisory and command personnel, staffs and services. It is held so that commanders (chiefs) receive skills in controlling CD personnel and facilities in practice, usually under integrated topics, with communications facilities and with a move to control points. Separate formations may take part in it.

The special tactical exercise is a type of special formation training which permits each formation to practice its specific mission under conditions of a changing situation; to make subunits more cohesive; for personnel to improve practical skills in performing work; and in addition, for command personnel to practice skills in directing formations.

The integrated installation exercise is the highest form of training for command personnel, control entities, services and installation CD formations. All supervisory and command personnel of the installation, a maximum number of CD formations, workers and employees (kolkhoz members) not included in formations, as well as student youth and the populace not engaged in production or the sphere of services take part in it under a single concept and plan. The entire complex of missions is worked out most fully at integrated installation exercises and the installation's degree of CD readiness is identified.

CHAPTER 1

FUNDAMENTALS OF CIVIL DEFENSE

1. Role and Place of Civil Defense in Overall System of Defense Measures

The role and place of civil defense in the country's system of defense measures are determined primarily by the nature of modern warfare and its features.

A future war, if imperialist states succeed in unleashing it, will bear an acute class character and become a decisive armed clash of two opposing social systems--capitalism and socialism. A majority of the world's countries will be drawn into its orbit.

The acute class character of the war will predetermine the irreconcilability and decisiveness of its political and military objectives. The warring sides will strive not only to deliver maximum destruction on armed forces, but also to undermine the most important administrative-political and industrial centers and entire economic regions of the enemy.

This war will be conducted chiefly by strategic nuclear weapons: intercontinental ballistic missiles, strategic aviation, and nuclear-powered strategic submarines.

The unlimited use of nuclear weapons will predetermine the exceptionally destructive, annihilative character of the war. An even more dangerous situation may take shape if the enemy uses chemical or bacteriological weapons.

After employment of mass destruction weapons, large territories may be contaminated by radioactive, toxic chemical and bacterial substances. This will involve considerable losses among the populace and will complicate the conduct of rescue and emergency restoration work.

There will be no substantial difference between front and rear in a modern war. Losses will be suffered not only by personnel of the armed forces, but also by the civil populace.

The probable enemies' possession of modern means of armed warfare allowing the delivery of attacks not only against armed forces, but also against objects situated in the deep rear made it necessary to organize a defense of the populace and economy throughout the country's territory and required creation of an organization capable of elaborating and conducting measures for defense of the populace, physical assets and national economic installations against mass destruction weapons.

USSR Civil Defense, created in 1961, became such an organization in our country.

USSR Civil Defense is a component of the system of statewide defense measures and is designed to provide protection of the populace and national economy against enemy mass destruction weapons and other means of attack and to conduct rescue and emergency reconstruction work in centers of destruction (contamination) and areas of natural disasters.

Civil Defense was set up on the basis of Local Air Defense (MPVO), organized in our country in 1932. The difference between CD and MPVO lies chiefly in the scale of protective measures. Civil Defense encompasses our country's entire enormous territory, while MPVO was given missions of defending the populace and national economic installations against enemy bomber aviation only in zones of its effective employment. The tasks of defending against mass destruction weapons which CD must accomplish are incomparably more complex than defense against conventional means of destruction.

Under wartime conditions, civil defense will accomplish protection of the country's rear together with the armed forces. Victory over the enemy depends to a significant extent on the rear's firmness and reliability of its functioning. While the Armed Forces will defend the rear by active means--by destruction of the attack weapons themselves (missiles at launch positions, aircraft at airfields and submarines at sea) or by intercepting means of destruction on the way to the target, CD will perform defensive measures in protecting the rear and has to achieve a maximum reduction in the effects of destructive factors of modern weapons on the rear. USSR Civil Defense Chief Arm Gen A. T. Altunin states that "we have very convincing and extensive facts showing that with a good organization of civil defense and skillful implementation

of a large complex of statewide measures for defense of the populace and the economy, it is possible to achieve a significant reduction in the pernicious effects of the use of mass destruction weapons."*

The role of CD is revealed with extreme clarity in its missions, the scope of which may change both in content and in methods of accomplishment depending on the situation.

2. Civil Defense Missions

Civil defense missions are varied, capacious and complex in their content. They can be divided into three groups.

The /first group/ includes missions of defending the populace. These missions are the primary and basic missions of civil defense.

Ensuring the security of Soviet citizens has been at all times and will be the primary objective of all defense measures of the Soviet state. Success of accomplishing the other civil defense missions depends on successful accomplishment of missions in defense of the populace. V. I. Lenin pointed out in the first years of Soviet power: "The first productive force of all mankind is the worker, the toiler. If he survives, we will save and restore everything...but we will perish if we do not save him."**

Within the CD system, defense of the populace is accomplished chiefly by sheltering it in protective structures, dispersing and evacuating it and providing it with individual protective gear.

Providing the entire populace with protective structures (refuges, anti-radiation shelters) is accomplished in a differentiated manner depending on the importance and location of the city, rayon, populated point or national economic installation.

Dispersal and evacuation of the populace are carried out to safe areas of the countryside.

Provision of individual protective gear to the populace also is important.

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*Altunin, A.T. "Civil Defense Today," in the collection, "Lyudi i dela grazhdanskoy oborony" [Civil Defense People and Work], Moscow, 1974, p 10.

**Lenin, V. I. "Polnoye sobraniye sochineniy" [Complete Collected Works], XXXVIII, 359.

The /second group/ of CD missions takes in measures aimed at assuring stable operation of installations and sectors of the national economy under wartime conditions, i.e., at maintaining their capability to produce established types of products in the amounts and product mixes prescribed by appropriate plans. For installations and sectors not producing physical assets (transport, communications and so on), stability of operation is taken to mean their capability to perform their functions during a war.

The /third group/ of CD missions includes measures involving the performance of rescue and emergency reconstruction work (SNAVR) in centers of destruction (contamination), and in zones of catastrophic flooding, natural disasters and sites of major industrial accidents.

The primary objective of SNAVR is to rescue victims and give them necessary assistance. Without the successful performance of this work, it will be impossible to adjust the work of national economic installations and sectors affected by mass destruction weapons or to create normal conditions for vital activities of the populace of cities and rayons which have suffered.

3. Civil Defense Organizational Structure

The civil defense organizational structure is determined by the system of state organization in the country and by the structure of entities of state authority and state control. It provides for the performance of missions assigned to it both in peacetime and in wartime without substantial changes of the structure, forms and methods of work established in peacetime.

Civil defense is set up on a territorial-production principle. Its management is carried out both through the soviets of workers' deputies and through ministries, departments and establishments.

CD organizational structure includes management, staffs, services and forces of civil defense.

/Management/ consists of civil defense chiefs at all levels who are directly responsible for carrying out CD measures.

Civil defense chiefs are the following:

Chairmen of republic councils of ministers in union and autonomous republics;

Chairmen of executive committees of soviets of workers' deputies in krays, oblasts, cities and rayons, and chairmen of rural (settlement) soviets in those soviets;

Heads of ministries, associations and departments in sectors of the national economy, production associations and departments respectively;

The heads of enterprises, organizations, establishments, kolkhozes, sovkhozes and educational institutions.

CD chiefs bear complete responsibility for the organization and status of CD and for accomplishment of all its measures. They exercise day-to-day leadership personally and through the staffs set up under them.

/Staffs/ are control entities of CD chiefs and the organizers of all practical work on CD matters. They organize and conduct their work on the basis of decisions by CD chiefs and instructions of superior staffs.

/Civil defense services/ are set up to conduct special CD activities, to prepare personnel and facilities for this, and to direct these personnel in conducting SNAVR and performing other missions.

Civil defense services are set up by decisions of the appropriate CD chiefs. They are guided in their work by instructions of the CD chief and, on special matters, by instructions of the superior service.

The following services may be set up depending on the availability of a base and local conditions: communications, medical, firefighting, engineer, radiation and chemical defense, municipal and technical, motor transport, protection of public order, logistical, trade and nourishment, livestock and plant protection, and others.

The base for setting up services consists of enterprises, organizations and establishments subordinate to the corresponding CD chiefs, and, at installations, the departments, shops, laboratories and so on.

The head of the organization (establishment) used as the base to set up a service is appointed chief of the service.

Services are not set up at small installations. Their duties are assigned to corresponding departments of the installation.

Under the direction of CD chiefs, services take part in planning and practical implementation of CD measures. They set up, outfit and prepare nonmilitarized formations of services and control their actions.

/Civil defense forces/ consist of military units and nonmilitarized CD formations. Nonmilitarized formations comprise the foundation of CD forces.

Nonmilitarized formations are set up at industrial enterprises, establishments, educational institutions, kolkhozes, sovkhozes and other national economic installations. They are subdivided by purpose into general-purpose formations and service formations.

General-purpose formations are composite detachments (teams, groups), composite work mechanization detachments (teams), and rescue detachments (teams, groups). They are intended for conducting rescue and emergency reconstruction work in centers of destruction (contamination) and can be used to eliminate the aftermath of natural disasters and industrial accidents.

Service formations are intended to conduct special measures and projects. They comprise reconnaissance groups (teams), communications groups (teams), detachments of medical aid teams (medical aid teams), firefighting teams, decontamination teams (groups), emergency technical teams (groups), refuge and shelter service groups (teams), and teams (groups) for protection of public order. In addition, livestock and plant protection teams are set up as sovkhozes and kolkhozes.

Installation formations are set up according to the production principle. They are manned with workers, employees, kolkhoz members, students, pupils and other able-bodied citizens by shops, sectors, brigades, faculties and courses.

The composition and technical outfitting of formations is determined based on their purpose, specific nature of production, number of workers (employees, kolkhoz members) at the installation, and presence there of means of mechanization used in CD interests.

Formation personnel are provided with individual protective gear.

4. Preparation of the Country Ahead of Time for Protection of the Populace and the National Economy

As it is generally known, combat readiness of the Armed Forces, the size and particularly the qualitative status of the Armed Forces, and combat capabilities of the Army and Navy comprise the basis of the country's defenses. But the country's defenses depend not only on the might of the Army and Navy, but also on the condition of the economy, science and technology; on the size and composition of the populace; and on readiness for modern warfare.

The timely assurance of the vitality of the country's economy and rear as a whole acquires particularly great importance under present-day conditions as never before. For example, if measures for increasing the operating stability of the national economy and for protection of the populace have not been carried out ahead of time, at the very beginning of a war this may lead to a sharp drop in industrial production, disruption of economic ties among individual regions, disabling of the transportation, control facilities and power systems, the destruction of cities, and to enormous human and material losses. As it is known, it is impossible to wage war without a reliably operating rear.

What caused the special need for timely accomplishment of measures for protection of the country's rear under present-day conditions?

Present-day war may begin by a surprise enemy attack with mass use of nuclear missile weaponry. In this case the country may suffer very great human and material losses inasmuch as the measures which would allow a reduction of these losses will not be accomplished because of a lack of time.

CD must be prepared to accomplish defense missions under such very difficult conditions. It must carry out a complex of measures opportunely in peacetime for assuring protection of the populace.

There may not be the time needed to perform evacuation and dispersal with a surprise enemy attack. In this case the population can be protected only by sheltering it in protective structures.

Success in protecting the population depends on its degree of training in methods of protection against mass destruction weapons. There can be sufficient numbers of collective and individual protective gear, but if the people are not able to use it, this gear will have little effect.

Training of the populace in CD is obligatory. Its obligatory nature is dictated by the statewide missions of USSR Civil Defense.

An important and laborious CD mission is to carry out measures for ensuring operating stability of national economic installations and sectors in wartime. Accomplishment of this mission is achieved by preparation and conduct of measures ahead of time aimed at reducing possible destruction and losses with the delivery of enemy nuclear attacks; by increasing the reliability of the power supply, steam supply and water supply; by preserving physical assets and unique equipment; and by conducting firefighting and other measures.

For example, the underground placement of power, engineering and other lines increases their stability many times over in comparison with the practice of laying them along trestles and walls of buildings. But the shift of such lines underground cannot be accomplished during the brief period of the threat of an attack, let alone in a surprise enemy attack. Therefore a large part of measures to increase operating stability of national economic installations and sectors must be conducted in peacetime during the construction or reconstruction of installations.

Under present-day conditions, therefore, assurance of the state's vital activities in wartime and, in the final account, victory in war depend on the timely, comprehensive and purposeful preparation of the country's rear.

5. Grouping, Echelonment and Composition of Civil Defense Forces

The assignment of a certain number of CD forces, i.e., their grouping, is provided for conducting rescue and emergency reconstruction work. The size and composition of these forces is determined by the scope and nature of possible work and conditions under which it is assumed the work will be conducted.

The grouping of forces must correspond to the concept of upcoming actions and ensure rapid movement of formations to centers of destruction (contamination), development of SNAVR in short periods of time across a broad front, its continuous performance, a build-up in efforts using subsequent shifts, echelons and reserves, the possibility of maneuvering forces and facilities during the work from one installation to another or to other parts of the city, and flexible control of CD forces.

Depending on the possible situation and assumed nature of SNAVR, the force groupings may consist of reconnaissance formations, traffic control detachments, and main body.

/Reconnaissance/ formations reveal the situation formed as a result of the enemy's use of mass destruction weapons or as a result of natural disasters.

Reconnaissance groups or teams are employed to perform reconnaissance on movement routes of CD forces to the center of destruction (contamination) and directly in the center. The size and composition of these groups (teams) depends on the number of routes assigned for movement of the formations, the magnitude and importance of the SNAVR objective, and on the available personnel and facilities.

Reconnaissance groups (teams) are reinforced with specialists and, depending on the assigned mission, are provided with gear, communications facilities and means of transportation.

/Traffic control detachments (OOD)/ are intended to support the movement of CD forces to centers of destruction (contamination). Usually one OOD is assigned to each primary route, and it operates immediately behind the reconnaissance.

Composition of the OOD depends on the character and presumed scope of work along the movement route. It must ensure the repair of destroyed and damaged road sectors and bridges, organization of crossing and fords, arrangement of passages and organization of bypasses in obstructions, decontamination of passages in sectors of radioactive or chemical contamination, localization of fires along movement routes and approaches to SNAVR areas and, additionally, clearing routes of snowdrifts in winter.

The grouping's /main body/ usually consists of two echelons and a reserve.

The first echelon is intended to perform primary rescue and emergency reconstruction work at installations which continue their work in wartime. The second echelon is intended for developing the work front in centers of destruction (contamination) and, where necessary, for a partial or complete relief of first echelon personnel. The number of shifts in each echelon is determined based on the availability and capabilities of personnel and facilities, the scope of upcoming work, capabilities of transportation, and presence of lines.

The reserve is intended to accomplish missions which arise suddenly and to build up the efforts of the echelons at the most important work sites.

As a rule, locations for the grouping of CD forces intended to perform SNAVR are assigned near railroads, highways or dirt roads convenient for rapid movement to centers of destruction (contamination) or for maneuver to another axis.

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Successful accomplishment of civil defense missions and the practical implementation of all its measures depend to a decisive extent on the political-moral status of the populace and primarily on personnel of CD formations. Well-organized party-political work is an important means for ensuring the high political-moral status of the populace.

The basis for party-political work within the CD system is the indoctrination of Soviet citizens in a spirit of utter devotion to the socialist Motherland and the cause of the Communist Party of the Soviet Union, unwavering faith in the triumph of communism, conscientious performance of their patriotic duty and a high sense of personal responsibility for the homeland's security. The primary element in the Soviet citizen is his ideological conviction. It makes him steadfast, courageous, bold, resourceful, self-starting, persistent and capable of displaying self-control, discipline and a feeling of comradeship and mutual assistance at the necessary moment. All these qualities facilitate people's heroic conduct in the most difficult situation.

All party entities and party organizations are performing varied organizational and political work aimed at ensuring that the populace always is ready for immediate bold actions under all conditions.

6904

CHAPTER 2

BASIC METHODS FOR PROTECTING RESIDENTS AGAINST WEAPONS OF MASS DESTRUCTION AND DURING NATURAL DISASTERS

Protecting residents against weapons of mass destruction consists of a system of measures which are conducted to preclude casualties among people from nuclear, chemical and biological weapons or to minimize the level of their effect.

The basic methods for protecting residents are:

Sheltering them in protective shelters;

Dispersing blue and white collar workers from enterprises and organizations and evacuating inhabitants of major cities to the country;

Supplying all citizens with individual protective gear.

Along with this, the following are also accomplished to ensure that residents are protected against weapons of mass destruction:

Universal, mandatory training for residents in methods of defense against weapons of mass destruction;

Organizing timely warning about the threat of an enemy attack and about his employment of weapons of mass destruction;

Protecting food, water, livestock and plants against contamination by radioactive, toxic and biological agents;

Setting up nuclear, biological and chemical (NBC) reconnaissance and laboratory monitoring;

Conducting fire, epidemic and hygenic protective measures;

Organizing and conducting rescue and emergency recovery operations in the centers of destruction (contamination).

1. Civil Defense Protective Structures for Sheltering Residents

Blast shelters, fallout shelters and improvised shelters are CD protective structures designed to protect residents.

Pressurized, protective structures which provide protection for people against all the casualty-producing effects of a nuclear burst and against toxic and biological agents are called /blast shelters/. Blast shelters located in zones of possible large-scale fires or secondary centers of chemical contamination (resulting from the destruction of industrial facilities) also provide protection against high temperatures, the toxic effects of combustion and strong toxins.

As a rule, blast shelters are erected in advance, in peacetime. At the threat of an enemy attack, hasty blast shelters are constructed to quickly make up for the shortage of blast shelters.

For the most part, blast shelters are built in the cities which are the most probable targets for weapons of mass destruction, primarily nuclear weapons; they must be located near the people being sheltered.

Blast shelters can be built-in (built in the underground part of the building) or detached (located outside the building). Both the detached and the built-in blast shelters must be buried.

Current underground facilities (apartment building basements; public, administrative and industrial building basements; various tunnels; etc.) and also underground excavations (for example, mines and pits) can be adapted as blast shelters.

A blast shelter usually consists of a main room (to accommodate the people being sheltered), a room for the ventilation system, air-locks (double doors) at the entrances and sanitary facilities. It must have at least two pressurized entrances and one or two pressurized doors. In addition, a built-in blast shelter must have an emergency exit.

The compartments of the blast shelter's main room are equipped with benches to sit on and wooden cots to lie on. The number of cots is calculated so that each person being sheltered inside the blast shelter will be able to lie down and rest for 7-8 hours during a 24-hour period.

The filtration-ventilation unit is located in the ventilation system room. This unit has two operating modes--a simple ventilation mode (only dust, including radioactive dust, is removed from the air entering the blast shelter) and a filtered ventilation mode (toxins, biological agents and radioactive dust are removed from the air).

The blast shelter must be equipped with a water supply, sewage, heating and lighting systems and it must also have a radio and telephone. In addition, each blast shelter is equipped with a package of equipment to conduct reconnaissance of contaminated terrain (protective clothing, radiation and chemical reconnaissance devices and signs for fencing off contaminated areas), various tools (firefighting equipment and tools to dig out of an obstructed shelter exit), a first-aid kit and emergency lighting equipment.

In peacetime, the blast shelters can be used to meet the needs of the national economy and local residents. They must be used without upsetting their protective properties. Preparations for receiving people being sheltered in these blast shelters must be planned and conducted within the shortest possible time.

/Fallout shelters/ are structures which provide protection against the radioactive and thermal radiation from a nuclear burst and also against droplet toxins. The shelters, which are constructed in areas of possible slight destruction, must also provide protection against the collapse of individual building components.

Fallout shelters are primarily built in small cities, urban settlements and everywhere in rural areas. These shelters are also built in close proximity to the people being sheltered.

The following can be equipped as fallout shelters: underground passages, basements, cellars, vaults, vegetable cellars, mine excavations and other underground and partially buried facilities as well as the first floor of buildings.

Fallout shelters are covered in more detail in Chapter 3 Section 1.

/Improvised shelters/ are slit trenches, trenches, undergound tunnels, passages and other buried structures. They can be built or adapted to shelter people within a short period of time and they provide a significant reduction in the effects of weapons of mass destruction.

It is recommended that improvised shelters be built everywhere: on the premises of enterprises, organizations and institutions; in residential areas; at evacuation assembly centers; at rail, sea, river and bus terminals and stations; at airports; at dispersal and evacuation embarkation centers; and at other places where people are congregated. With due consideration for existing blast shelters and fallout shelters, the overall capacity of improvised shelters to be built must be calculated for the entire population, both at their place of work and residence.

Improvised shelters are built by the residents themselves from local materials at hand. Improvised shelters are subsequently improved, completely equipped and brought up to the level of protection which fallout shelters have.

At the threat of an enemy attack, all shelters are marked by special signs placed in a prominent location at all entrances and on the outside doors. Routes to the protective structures are marked with signs.

Residents must have a good knowledge of the location of the protective structures designed to shelter them and of the rules for filling them up and remaining in them.

Protective structures are occupied on the civil defense signals: Air Raid, Chemical Attack, Radioactive Contamination and Biological Contamination. They are closed on the Close Protective Structure signal and also when full.

Upon receipt of the appropriate orders or in the event of an emergency in a protective structure--one which threatens people's lives--they can leave the blast shelter (shelter) at the blast shelter (shelter) commander's instructions.

2. Dispersing Blue and White Collar Workers and Evacuating the Residents of Cities

Dispersal includes the organized removal of blue and white collar workers--who will continue to work in major cities during wartime--beyond the city limits and putting them up there. Evacuation is the organized removal--on foot and by all means of transportation--of the rest of the population from major cities and also from areas of possible catastrophic flooding.

The primary requirements levied on areas where people being dispersed or evacuated will be accommodated are:

Ensuring their safety against the effects of the blast wave and thermal radiation from a nuclear burst and also from flooding when hydraulic engineering structures are destroyed;

Ensuring favorable conditions for creating CD force groupings and committing them to a center of destruction;

The presence of the minimal conditions required for people to exist, including sanitary and epidemiological conditons. There must be at least two square meters of living space for each person, including the local population.

Dispersal and evacuation of blue and white collar workers and their families is organized on an industry basis. The evacuation

of the remaining residents who are not employed in an industry and who are not dependents of blue and white collar workers is organized by residential agencies (the AMO [apartment management office], the housing management) at their place of residence.

Locations (one or several populated areas) beyond the city limits are assigned to each enterprise, installation or educational institution whose blue and white collar workers are subject to dispersal or evacuation.

Blue and white collar workers being dispersed are put up in the closest areas beyond the city limits and in populated areas located as close as possible to highways, railroads, stations or piers so they will waste the minimum amount of time travelling back and forth to their place of work in the city. As a rule, the families of blue and white collar workers are housed together with the head of family; however, when there is a housing shortage, they can be housed in more remote populated areas but in the same evacuation sectors where the heads of families are located.

Educational institutions are located in populated areas beyond the city limits where there are provisions for teaching. General education school facilities and public and administrative buildings are assigned to them.

Pioneer camp facilities, boarding houses, recreation centers and children's institutions (to increase space) are used to accommodate children's institutions being evacuated.

Residents who are not connected to production activities and are not dependents of blue and white collar workers being dispersed are located in the more remote areas beyond the city limits; residents who are being evacuated from areas of possible catastrophic flooding are located in populated areas located near the flooded areas.

Dispersal and evacuation is directed by republic, oblast (kray), city and city rayon CD chiefs and their staffs. The immediate accomplishment of this mission is assigned to specially created evacuation commissions and to the managers of enterprises, institutions, educational institutions and residential agencies.

/Evacuation commissions/ are set up at republican councils of ministers; ministries and departments; executive committees of oblasts (kray), city and rayon councils of workers deputies; and at major national economic facilities. Evacuation reception committees are set up on the executive committees of the councils of workers deputies in rural areas, on rural (village) councils

and at kolkhozes and sovkhozes to organize the reception of people being dispersed or evacuated.

The deputy chairmen of the councils of ministers, the deputy chairmen of the executive committees of the soviets of workers deputies and the directors of ministries, departments and national economic facilities are assigned as commission chairmen. The commissions are made up of responsible officials from party and planning agencies, CD staffs and support services, transportation organizations, public educational institutions, social welfare institutions, public health agencies, trade and catering institutions, law enforcement agencies, military commissariats and communications agencies.

Evacuation assembly centers (EAC) and evacuation reception centers (ERC) are designated to carry out evacuation arrangements. In addition, the following are also designated: when residents are being removed on foot--march routes, initial points, traffic control posts, stops, intermediate evacuation sites (when necessary), aid stations and warm up stations; when residents are being removed with transportation--embarkation stations (centers) and disembarkation centers. Places for shelter are specified along the march routes.

/Evacuation assembly centers (EAC)/ are set up for the residents' assembly, registration and organized departure to initial points when travelling by foot or to transportation embarkation centers (stations).

The locations of EAC's are determined based on the mode of transportation for the residents being evacuated. Moreover, the number of people being evacuated by each mode and type of transportation as well as ease in assembling and dispatching people are taken into consideration. For people leaving on foot, the EAC's are located near the outskirts of the city, near the final destinations of city transportation or directly at enterprises, organizations and educational institutions. When people are leaving by rail, water and air, the EAC's are located near railroad stations, ports (piers) and at enterprises which have rail spurs and maritime (river) piers. When residents are being evacuated by motor vehicle, the EAC's are located on the territory of (or near to) the enterprises and institutions whose blue and white collar workers are leaving by this mode of transportation.

Each EAC is assigned a number and blue and white collar workers of specific enterprises or the residents of specific apartment management offices (housing managements) are attached to it. The EAC staff is assigned from among the employees of the executive committee of councils of workers deputies and from among the

employees of the enterprises and institutions for which the EAC was set up.

/Evacuation reception centers/ are set up to meet people arriving in the countryside, register them and send them on to their final destinations. They are set up by the rayon evacuation reception commissions at the evacuee disembarkation centers. The ERC's can also be set up at intermediate points when residents are being evacuated on foot.

The appropriate CD chief establishes the number of evacuation reception commissions and ERC's based on the number of people arriving and the extent of arrangements required to support them.

/March routes/ for people being evacuated on foot are established in advance; at the threat of an enemy attack, they are marked and prepared.

The responsibility for route status and preparations is assigned to the appropriate CD chiefs who control the roads.

/Initial points/ for foot traffic are designated by the rayon CD chief at convenient locations beyond the city limits.

/Traffic control points/ are designated on column march routes to ensure movement schedules are met.

As a rule, foot marches are planned to a 24-hour transit distance to get beyond the possible destruction zone. /Stops/ are provided for people to rest: a short stop (for 10-15 minutes) after each 1-1.5 hour of travel and a long stop (for 1-2 hours) at the beginning of the second half of the day's travel, as a rule, beyond the possible severe destruction zone.

For people being evacuated on foot whose relocation areas are located at a great distance, /intermediate evacuation points/ are designated in populated areas beyond the possible destruction zone; these populated areas are located close to the roads along the evacuation routes in order to facilitate the transportation of people from these points.

/Aid stations/ are set up on the evacuation routes to render assistance to the sick. /Warm up stations/ are set up near the stops and at intermediate evacuation points when it is cold.

Improvised shelters are set up near the EAC's, stops and warm up stations to shelter people in the event of a nuclear strike during the evacuation; provisions are also made to use nearby

basements, cellars, buildings and structures suitable for this purpose.

/Embarkation centers/ are set up at rail stations, depots, and platforms; at airports; at ports and piers; and on enterprise spur lines. As a rule, motor vehicle embarkation centers are set up directly at the EAC's.

People (staff) are allocated to support embarkation center operations by assigning evacuees to cars, to facilities on board ship and to motor vehicles. During embarkation, assistance groups are set up to assist the disabled, the infirm, old people and women with small children.

/Disembarkation centers/ are located near the evacuees' dispersal location.

CD support services and transportation agencies organize comprehensive support for evacuation arrangements according to specially developed plans. Moreover, support for highway transportation receives the greatest attention.

All existing means of transportation in the national economy are used to disperse and evacuate residents.

Provisions are made to increase transportation capabilities in order to carry out evacuation measures as quickly as possible. In rail transportation, the areas served by city trains are expanded; the maximum number of railroad stations, platforms, loading sites and spur lines are earmarked for embarkation and disembarkation purposes. Not only passenger cars, but also enclosed freight cars are used to transport people; when there are not enough of these, gondolas and flats are used. The number of cars in passenger and freight trains is increased to the maximum; the capacity standards for cars are increased.

The following motor vehicles are used to transport people: buses, cars, specially-equipped trucks and trailers and, when necessary, dump trucks; the load capacity for motor vehicles is increased. Motor vehicles are used in a centralized manner, regardless of their departmental affiliation.

Motor vehicle columns are established ahead of time; a march route is established for each column. As a rule, motor vehicle transportation is planned for short distances.

Motor vehicles from rural areas and cities which are not being dispersed or evacuated are used to transport people being evacuated and dispersed to their destinations from stations,

ports, piers and other disembarkation centers as well as from intermediate evacuation points.

Ships are also used in a centralized manner, regardless of departmental affiliation. Passenger, cargo-passenger, cargo and industrial ships carry out transfers. During the period between navigable seasons, other types of transportation are used as a back up for transfers planned for ships in waterways subject to freezing.

In certain cases, aircraft can be used to evacuate individual institutions and organizations deep within the country.

3. Individual Protective Gear

Individual protective gear is subdivided into respiratory protective gear and skin protective gear. Individual protective gear also includes individual medical protective kits.

/Respiratory protective gear/ includes filtration and insulated protective masks and respirators. The protective masks are designed to protect the respiratory organs against NBC agents and substances; the respirators are primarily designed for protection against radioactive dust.

In addition to this industrially manufactured protective gear, improvised devices can be used to protect the respiratory organs--cloth dust masks and gauze bandages. It is important that every adult know how to make these devices and it is important that he have them at his residence and at his place of work.

/Skin protective gear/ includes: protective coveralls, light protective suits, protective boots and gloves and protective filter-type clothes.

The means of prevention and treatment (antidotes) contained in the AI [expansion unknown] kit and the emergency personnel decontamination gear, specifically the individual chemical defense kit, are the primary /individual protective aid kits/.

Accumulating a stockpile of individual protective gear, maintaining it in constant readiness and issuing it to residents in a timely manner are very important civil defense missions.

4. Protecting Residents During Natural Disasters

Nautral disasters are natural phenomena which disrupt the normal life of residents in a certain area, destroy physical assets and, in certain cases, bring death to people and livestock.

Natural disasters usually include earthquakes, flooding, severe flooding, hurricanes, snow slides, snow drifts, landslides, avalanches and mud flows. They can also arbitrarily include large-scale forest and peat fires.

Industrial accidents, similar to natural disasters in nature and results, sometimes occur at industrial enterprises and in transportation.

Natural and industrial disasters are local (for example, a cave-in within a single facility) and large-scale, which spread beyond a facility, populated area or region (for example, an earthquake or flood).

CD manpower and equipment can be used to fight large-scale fires and for disaster control and industrial damage control efforts. For these purposes, it is necessary to have manpower and equipment which are prepared ahead of time within the CD system; it is necessary to train the personnel of these forces to operate efficiently in controlling the natural disasters typical of a given area.

In the majority of cases, natural disasters occur without warning; they cannot be completely averted. Therefore, the residents of the areas where they may occur must constantly be ready to implement the appropriate protective measures and disaster control efforts. Their primary efforts must be directed at rescuing people located in the disaster area and also at protecting physical assets.

The following preventive measures must be conducted in cities and industrial facilities to avert /large-scale fires/ and to create more favorable conditions to extinguish them: increase the fire resistance of buildings and structures; locate warehouses with flammable materials and fuels at a safe distance from other buildings and structures and put warehouses underground; put limitations on locating large warehouses with highly combustible materials within built-up areas; install hydrants on industrial water mains so they can be used to fight fires; set up reserves of water for firefighting by building artificial reservoirs; construct approach routes to river and reservoir banks; and construct devices at the reservoirs themselves so firetrucks can easily take on water.

Precautionary fire safety measures in populated rural areas include: replace combustible roofing with fireproof roofing; remove highly combustible materials from attics and basements; and clear trash and junk out of yards and facilities.

The following basic measures are conducted when fires occur: warn the residents; organize and conduct reconnaissance of the areas where there are fires; seal off and extinguish the fire; remove victims from burning buildings and from facilities filled with gas and smoke; and provide first aid to people who have been burned or poisoned. Residents are evacuated from the area of a fire by means of an organized withdrawal (or by vehicle) to safe locations along the shortest routes.

Following are the primary protective measures which are conducted ahead of time in /earthquake danger areas/: building earthquake-resistant buildings and structures; setting up and conducting round-the-clock duty at seismic stations and centers; and explaining the rules for their conduct and their actions during earthquakes to residents.

Setting up an efficiently functioning warning system is one of the most important measures to be accomplished in earthquake areas.

After an earthquake, rescue and emergency recovery operations are organized: reconnoitering the places where people are located; removing victims from caved-in buildings (structures), rendering first aid to them and carrying them to safe locations; sealing off and extinguishing fires; isolating accidents and eliminating damage to public utility systems--damage which makes rescue operations more difficult.

In areas where /floods and severe floods/ are possible, local authorities and CD staffs make provisions in advance to: develop a system for warning the residents; organize reconnaissance and observation; develop plans to evacuate the residents and livestock and to remove physical assets from the flood zones; develop procedures for using river (maritime) transportation; and construct additional wharves, piers and access routes.

As a rule, residents are evacuated from flooded areas in two phases: first, to an area which is not flooded and then to temporary dispersal locations. When residents are being evacuated, transportation of physical assets and unique equipment and transportation or herding of livestock are also organized. In the event people are in the water, rescue operations are organized using helicopters, boats, cutters, ferries, rafts and other crossing equipment.

Emergency commissions are set up for disaster control efforts. Depending on their goals, these can be firefighting commissions,

flood control commissions, etc. They can be set up ahead of time when a forecast is available and they can also be set up after a natural disaster has occurred. The commissions are usually headed by the chairmen of the executive committees of soviets of workers deputies; they include CD chiefs of staff, garrison commanders, military commissars, MVD [Ministry of Internal Affairs] department (administration) chiefs and a number of the CD support services chiefs (communications, medical, firefighting, trade and messing, livestock and crop protection, etc.).

CD (territorial and facility) civilian [nevoyenizirovannyye] formations can be used to fight large-scale fires and for disaster control and industrial damage control efforts. The CD formations which are set up to accomplish unexpected missions are used first.

CHAPTER 3

PROTECTION AGAINST FALLOUT

Nuclear bursts are accompanied by the formation of a large number of radioactive substances. During fallout, especially for ground bursts, large areas of territory are contaminated, areas immediately adjacent to the burst and those separated from it by tens and even hundreds of kilometers. A radioactive cloud forms in the area; the dimensions and shape of this cloud are primarily dependent upon burst yield and type of burst and also on so-called average wind speed and direction. People and livestock inside the path of the cloud are subjected to external radioactive exposure.

There is always the danger that the ground layer of the air will be "contaminated" by radioactive substances within the contaminated territory. This "contamination" of the air will take place both at the time of radioactive fallout from the burst cloud and after this process ends when dust is raised from the ground by the wind, moving vehicles and operating construction (agricultural) vehicles.

The radioactive dust settles on plant leaves, stalks and fruit and contaminates them. Plant contamination may also result from radioactive stubstances being drawn up from the soil by their roots. Water is contaminated when radioactive substances fall in rivers, lakes, wells and other reservoirs. Along with the "contaminated" feed and water, radioactive substances can penetrate animals, thereby contaminating livestock meat and milk.

Thus, along with the external radiation on contaminated territory, there is a danger that people will be contaminated as a result of the radioactive substances entering their bodies via the contaminated air, food and water.

Protection against fallout is organized to protect residents against radioactive substances.

/Protection against fallout/ is a system of measures conducted to preclude radioactive contamination of residents, CD formation personnel and agricultural workers or to minimize the effect of radioactive substances, maintain the work capacity of residents and CD formations and to support agricultural and industrial production activities.

Protection against fallout includes the following measures: making and using collective protective gear; issuing individual protective gear to residents; warning residents about the danger of radioactive contamination; organizing radiation reconnaissance and dosimetric monitoring; strict compliance by residents and CD formation personnel with established procedures for their conduct while located within radioactive contaminated zones; measures to protect agriculture; and steps for radioactive area damage control.

1. Establishing and Using Collective Protection Facilities

Collective protection facilities include blast shelters, fallout shelters and improvised shelters. This section only covers the construction and use of fallout shelters and the adaptation of household facilities as fallout shelters.

Depending on the level of fallout attenuation, fallout shelters are subdivided into three groups with gamma radiation attenuation factors of 20 to 200 and more.

The following can be used as fallout shelters: house basements and cellars; detached, buried facilities (vegetable cellars, vaults, warehouses and silage pits); and the first floor of stone buildings. When there is a shortage of existing facilities converted to fallout shelters, special construction of fallout shelters using local construction materials must be planned and, when necessary, implemented. Standard fallout shelter designs and the materials needed to construct them are provided in USSR Civil Defense Staff recommedations and in fallout shelter design instructions (CS-427-71 [construction standards]).

As a rule, specially constructed fallout shelters have the best protective properties. They are usually designed for an attenuation factor of 200 and an overpressure of 0.2 kilogram-force per square centimeter; therefore, they can provide reliable protection against radiation exposure and partial protection against the blast wave of the nuclear burst

and secondary casualty-producing factors. This type of shelter can be used to accommodate aid stations, communication centers and auxiliary command and control centers in the countryside.

The basic requirements levied on fallout shelters are: a radiation attentuation factor of at least 20; protection against radioactive dust penetrating the shelter; appropriate conditions for people to remain in the shelter at least two days without interruption; and a shelter location near people's places of residence (work).

A radiation attenuation factor K is calculated when existing, buried facilities (cellars, basements, etc.) and the first floor of industrial and residential stone buildings are being prepared and also when new fallout shelters are being constructed. This factor depends on the thickness and density of the ceiling and wall materials (for above-ground fallout shelters).

The value for the 50 percent attenuation layer--i.e., the thickness of a layer of material which attenuates gamma radiation by a factor of 2--is used to describe gamma radiation attenuation. The values of the 50 percent gamma radiation attenuation factor for selected construction materials are provided in Appendix 1.

The following formula can be used to calculate the gamma radiation attenuation factor for any layer of a given material:

$$K = 2^{\frac{h}{d_{50}}}$$

where h is the thickness of the material in centimeters and d_{50} is the 50 percent attenuation layer in centimeters.

When ceilings are made of various materials, the attenutation factor is calculated for each of them and then the values obtained are multiplied together.

/Example/. Calculate K for a fallout shelter (in the path of the radioactive cloud) with a wood roof and a 50-cm layer of dirt fill.

Solution. Using the formula $K = 2^{\frac{h}{d_{50}}}$ and the values for d_{50} taken from the table (Appendix 1) of 21 and 8.4 cm, we get:

$$K_1 = 2^{\frac{40}{21}} \approx 4; \quad K_2 = 2^{\frac{50}{8.4}} \approx 64;$$

$$K_{TOT} = K_1 \cdot K_2 = 4 \cdot 64 = 256$$

Thus, the protective properties of shelters are defined by the radiation attentuation factor. The larger it is, the more reliable the shelter.

Fallout shelters must have facilities for the people being sheltered, sanitary facilities and others. The filtration-ventilation equipment (commercial or improvised) can be in-installed both in a special room and in the room for the people being sheltered.

The rooms for people being sheltered must provide the minimum conveniences for a long stay. Places to sit and lie down are constructed in them; the number of places must correspond to the number of people being sheltered. Places to lie down must make up at least 20 percent of the total number of places constructed in the shelter.

The number of entrances to the fallout shelter must be dependent upon shelter capacity but there must be at least two. The inclined part of the entrance to the shelter is located at a right angle to the main room.

Contaminated clothing storage facilities are located near the entrances. Racks for contaminated clothing--separated by curtains--can be installed instead of contaminated clothing facilities in shelters with a capacity below 50.

A ventilation system, heating system, water supply, sewage system and lighting system--which meet the requirements for using them in peacetime and wartime--must be provided for the fallout shelters.

Natural ventilation is provided for any size fallout shelter being constructed on the ground floor and first floor of buildings and also for shelters with a capacity below 50 when they are located in building basements. When it is not possible to provide natural ventilation for fallout shelters with a capacity greater than 50 located in building basements, forced ventilation is provided.

Electric motor-driven fans are used to feed air in the forced ventilation systems. The air inlets of the intake systems' ventilation conduits must be located at least 1-2 m from the surface of the ground and they must have deflectors which prevent radioactive dust from entering them.

Natual ventilation is provided for fallout shelters located in rooms in the basement and on ground floors of buildings via the air intake and exhaust conduits (ducts) due to the temperature differential between the outer air and the exhaust air. The air intake openings should be located at the bottom of the rooms and the exhaust openings should be at the top. Moreover, the exhaust openings should be at least 2 m higher than the intake openings.

Natural ventilation is provided for fallout shelters located on the first floor of buildings through openings in the upper part of the window frames and walls. The ventilation openings should be made on opposite sides of the shelter thereby ensuring cross ventilation.

The shelter heating system is designed as part of the building heating system and it must have a unit to switch it off when necessary. Provisions must be made to install temporary heating systems (stoves, electrical appliances and other devices) in facilities which are not heated in peacetime.

Water must be supplied to the fallout shelter from an external or internal water supply system. When there are no water pipes, it is necessary to provide places to put transportable containers for drinking water by estimating 3 l. per person per day.

Provisions must be made to install flush toilets in the shelters and to drain the sewage into an external sewage system. If there is no sewage system, provisions must be made for a lavatory or cistern with a cesspool which can be cleaned periodically. The capacity of the cistern is estimated by calculating 4 l. per person being shelterd for the entire shelter period.

Provisions are made to supply the fallout shelter with power from the common power network of the enterprise, village or city. Shelters located in facilities without electrical lighting must have transportable lighting sources (battery lights, flashlights, etc.).

To protect the shelter from flooding, a drainage ditch is dug around the perimeter of it and one is dug inside the shelter;

the latter is covered and leads to a well built within the double doors and covered by a grate.

The following requirements are levied on other facilities when they are converted to fallout shelters: the frame of the building must ensure the required gamma radiation attenuation and it must have a minimal area covered by windows and other openings; openings must be prepared to be sealed off when there is a transition to the shelter mode within a short period of time; the building must meet at least second-class fireproofing standards; the floor level must be at least 0.2 m above the water level.

The conversion of house basements, cellars and rooms to fallout shelters boils down to accomplishing the following basic types of work: improving their protective properties; sealing them up; and installing an improvised ventilation system.

To enhance the protective properties of facilities, door and window openings are sealed, a layer of earth is sprinkled on the roof and a cushioning layer of ground is put around the walls extending above ground level.

Facilities are sealed by thoroughly caulking cracks, slits and holes in the walls and ceiling; by caulking heat and water pipe entry points; and by adjusting doors and padding them with felt sealed by a thick cloth flap.

Shelters with a capacity up to 50 are supplied with natural ventilation via intake and outlet ducts. A dust filter--in the form of a frame with gauze stretched over it--must be installed in the intake duct. Flue systems can be used in houses instead of the outlet ducts; existing ventilation conduits can be used in large buildings in place of the outlet ducts.

Farm and warehouse buildings and, in isolated cases, silage pits can be converted to fallout shelters near work sites (at field stations, initial decontamination sites for agricultural produce, machinery centers, etc.). When converting, for example, a vegetable cellar to a fallout shelter, unnecessary openings are sealed up with bricks or sacks of dirt, the door to the entrance way is tightly adjusted, a double door is built and the part of the walls extending above the ground is cushioned with a layer of dirt; a 50-60 cm layer of dirt is put on top. Various fans can be adapted to provide ventilation; a sand-gravel filter can be used to clean the air.

Local materials are used to construct fallout shelters and to convert other structures to fallout shelters: timber is

used in the central and northern regions of the USSR and stone, bricks, adobe, etc., are used in the southern, treeless regions; bundles of brushwood and reeds can also be used. In firm ground, the shelter slope does not have to be covered; in loose ground, the slope is covered with poles, slabs, boards and other materials.

Fallout shelters can be built for 10, 20, 30, 40 people or more. But, it is necessary to bear in mind that, while natural ventilation is sufficient for shelters with a capacity of 10-30, forced ventilation must be installed in shelters for 40-50 people.

2. Supplying Residents with Individual Protective Gear

/Respiratory protective gear/ includes protective masks and respirators.

Depending on the primary operating principle for protection, protective masks are subdivided into filtration masks and air-supplied masks. The protective action of filtration masks consists of cleaning (filtering) harmful matter out of the air used for respiration with special absorbers and filters which are located in the filtering canister. The protective action of air-supplied masks is based upon completely isolating the respiratory organs from the environment and providing the oxygen required for respiration by generating it with a breathing apparatus.

Filtration masks designed for residents include: civilian protective masks CP-4u and CP-5 to protective adults and children's protective masks CPM-6m and CPM-6 to protect children (the first is for children from 1 1/2 to 12 years of age and the second is for children from 12 to 16 years of age). The IPC-4 [infant protective chamber] filter-type chambers are for protection of children up to 1 1/2 years of age.

The Filtration protective masks consist of three basic parts: the filtering canister, the face mask and the mask bag.

The face mask of the CP-4u, CPM-6 and CPM-6m protective masks is connected to the filtering canister by a connecting tube. The face mask of the CP-5 is a helmet face-piece which is directly connected to the filtering canister.

The masks for the CPM-4u only differ in length. To determine the required mask size, the length of the face is measured using a millimeter ruler and an even rod or using sliding calibers. In this case, the length of the face means the straight-line distance between the deepest indentation in the bridge of the nose and the lowest point of the chin. The first mask size

fits faces from 99 to 109 mm, the second size fits faces from 109 to 119 mm and the third size fits faces above 119 mm.

The helmet face-piece for the CP-5 is selected according to the size of the individual's head; the size is determined by measuring a circle running from the crown along the cheeks and back to the crown. Based on the results of this measurement, the helmet face-piece size is determined by using the table in Appendix 2.

The mask for children's protective masks are selected according to two measurements for the child's face: the first measurement is the length of the face (just like selecting a mask for the CP-4u); the second measurement is the width of the face (the distance between the most prominent points on the cheekbones; this distance is measured using a ruler or sliding calibers). Based on the results of these measurements, mask size is determined using the table in Appendix 2.

There are two types of protective mask canisters: standard and light-weight. The CP-5 and CPM-6 m units usually contain light-weight canisters.

The mask bag is designed to store and carry the mask in and to stow the filtering canister, face mask and various mask parts (boxes of non-fogging discs, an anti-fogging pencil for glasses, etc.).

Adults carry the filtration protective masks on their left side (the shoulder strap over the right shoulder) and children carry them on the right side (shoulder strap over the left shoulder). The children's protective masks can be carried on the side in the "ready" and "combat" positions; when the connecting pipe is not long enough, they can be carried on the chest.

In the ICP-4 infant protective chamber, contaminated air is cleaned by special dispersing cardboard. The chamber can be carried by one person.

Air-supplied protective masks are used when harmful substances (carbon monoxide, methane, nitric oxide and others) are in the air and when there is not enough oxygen in the air (when facilities are filled with gas or when working underwater).

The AP-46 and AP-46 m are the basic air-supplied protective masks supplied to CD formations. The AP-46 is only used on land and the AP-46 m can be used both on land and for work under water.

The air-supplied protective masks consist of the following basic units: face mask, breathing apparatus, breathing bag, housing and mask bag.

The R-2 is the standard respirator--a device for protecting the respiratory organs against radioactive dust. It consists of a filter-type half mask with two intake valves and one outlet valve, a headband and a nose device. The outside of the half mask is made from synthetic material and the inside is made from air tight film; a polymer fiber filter is located between these two parts of the half mask. When inhaling, air passes through the outer surface of the half mask and filter, radioactive dust is removed and the air passes to the respiratory organs through the intake valves; when exhaling, the air goes outside through the outlet valve.

The R-2 respirator is produced in three sizes. The respirator size required is determined according to the length of the face (just like the CP-4u mask).

The R-2D respirators are used for children from 7 to 17 years of age.

In addition to the respirators cited, a number of commercial respirators are used in industry: the DM-1 [diver's mask], the U-2K [universal], the MM-K [miner's mask], the RU-60 [expansion unknown] and others which can also be used for protection against radioactive substances.

Respirators do not protect the eyes. Various kinds of goggles must be used to protect the eyes against dust.

As mentioned previously, improvised protective devices can be used to protect the respiratory organs against radioactive dust; these devices include the CDM-1 cloth dust mask and cotton gauze bandages. These devices are easy to make and everybody can make his own.

The CDM-1 has a main part and a strap. The main part consists of 4-5 layers of cloth; eye holes are made in it and glass is put in them. Coarse calico, staple fabric, cambric, plaid and other materials are used for the upper layer of the mask; flannel, corduroy, cotton and wool fabrics are used for the inner and bottom layers.

After the mask is used in a contaminated area, it should be washed out several times with hot water and soap; after this, it can be reused.

The cotton gauze bandage has a layer of cotton over the gauze and a strap.

Various handy materials can be used for a short time as protection against radioactive dust: handkerchiefs, towels, cloth bandages, etc.

Devices for protecting the respiratory organs must constantly be maintained in a serviceable condition and ready for use. From the effects of stress and being knocked around, the glass in the goggles can be damaged, the metal parts can be dented, the face mask can be torn and the valves can be damaged. When protective gear is kept in a damp place, it can cause metal parts to rust. High temperature has a harmful effect on them. Therefore, protective devices for the respiratory organs should be kept in unheated, dry facilities. Water must be prevented from entering the canisters of filter-type protective masks.

/Skin protective gear/ is made from insulated and filtering materials. They can be air tight and non-airtight.

Protective suits and coveralls (airtight gear), protective capes, boots, gloves and aprons (non-airtight gear) are made from insulated material, specifically rubber-treated fabric.

The L-1 light protective suit is used when conducting NBC reconnaissance. It consists of a hooded jacket, trousers with protective boots, gloves and a cowl.

The protective coveralls are used during operations within a contaminated area. It consists of a jacket, trousers and hood sewn together (as a single unit). In addition to the coveralls, protective suits consisting of jackets and trousers made separately are used for operations in a contaminated area. The coveralls and suits are used together with rubber gloves, rubber boots and impregnated cotton cowls.

The CAPC-1 [combined arms protective cape] can be used as a cover, cape or coveralls. It is used as a cover when there is radioactive fallout from the cloud of a nuclear burst and when toxins are sprayed from the air. It is used as a cape when performing operations in a contaminated area.

The protective boots and gloves are designed to protect hands and feet when operating in a contaminated area or when handling contaminated equipment. Two types of protective rubber gloves are produced: summer, five-finger gloves and winter, two-finger gloves with a warm lining.

The protective aprons are used when equipment and various other items are being decontaminated.

Air tight protective clothing insulates the individual from the external environment. To avoid overheating the body, it is necessary to consider the maximum permissible periods of sustained work in this clothing in accordance with the following table.

Ambient Air Temperature, degrees C	Time in Insulated Clothing
30 and above	20 min
25-29	30 min
20-24	50 min
15-19	2 hr
15 and below	Over 3 hr

Filter-type skin protective gear also includes the FTC filter-type protective clothing and impregnated clothing and underclothes.

The FTC kit consists of cotton coveralls, underwear, a cowl and two pairs of foot cloths. When treated with a solution of water and a special paste, it provides protection aginst toxic vapors.

Impregnated clothing and underwear are ordinary shirts, trousers and underwear treated with a special substance to provide protection against toxic vapors.

As a rule, the skin protective gear which we have reviewed is designed for CD formation personnel. It is recommended that improvised gear be used to protect the remaining residents: covers and capes made from synthetic film and rubber-treated fabric and ordinary clothing and shoes prepared in the appropriate manner.

3. Organizing Radiation Reconnaissance and Dosimetric Monitoring

Radiation reconnaissance is an important measure in protecting against fallout. It is organized and conducted both by general-purpose formations and by operational service support formations.

The danger of the hidden casualty-producing effect of radioactive substances requires that radiation reconnaissance be conducted continuously and that its results be reported immediately to CD chiefs and staffs.

Radiation reconnaissance of the terrain along formation march routes, at national economic facilities and in populated areas is conducted by: radiation and chemical reconnaissance groups, radiation and chemical reconnaissance teams and radiation and chemical observation posts. They are assigned the following missions:

Detecting contamination of the terrain and air by radioactive substances and establishing the degree of contamination;

Monitoring changes in the degree of radioactive contamination in the terrain and in the air;

Sampling the air, water, soil and plant life to determine the degree of radioactive contamination;

Establishing and marking the borders of radioactive contaminated zones (areas) and determining routes for going around them;

Discovering sections of routes and areas with the least radiation level.

/The radiation and chemical reconnaissance group/ consists of reconnaissance teams and each team consists of 4-5 men. The group is equipped with radiation reconnaissance devices, communications equipment and individual protective gear; it is provided with transportation; it is able to reconnoiter 2-3 routes at a depth of 50 km.

The reconnaissance group conducts reconnaissance in motor vehicles, on motorcycles and on foot. As a rule, reconnaissance on foot is conducted when the radiation level is less than 3 R/hr [roentgens] and reconnaissance is conducted on motorcycles and motor vehicles when the radiation level is below 100 R/hr. When conducting reconnaissance, group leaders report their results to the superior who dispatched the reconnaissance team every 15-20 minutes.

/The radiation and chemical reconnaissance team/ can conduct radiation reconnaissance in the assembly area, on the march route to a center of destruction (contamination) and in the center itself during area damage control operations. The team consists of five men: the team leader, two chemical reconnaissance scouts, one dosimeter operator and a dosimeter operator-driver.

/The radiation and chemical observation post/ is usually deployed near the facility command post*; separate observers can be posted at formation assembly areas and in centers of contamination. The post's (observer's) mission is to observe the environment: the level of contamination of the air, soil, plant life and sources of water.

The radiation and chemical observation posts consist of three men--the chief and two scouts (a dosimeter operator and a chemical scout). It is supplied with reconnaissance devices, individual protective gear, communications equipment, a warning system, compass, map (outline or surface) and an observation log.

After receiving his mission, the post chief establishes the procedures for observation, logs the results in the observation log and maintains continuous communications with the facility CD staff. Upon detecting radioactive contamination, he makes an immediate report.

/Dosimetric monitoring/ is organized to obtain data to assess the condition of CD formation personnel and residents exposed to radiation. This monitoring must be conducted on a continuing basis and it is the duty of supervisors at all levels to organize it.

Dosimetric monitoring is conducted with dosimeters on a group and individual basis. The group method is used when personnel are located in similar exposure conditions; the exposure dose is measured with 1-2 dosimeters issued to the group and a single radiation dose is calculated for the entire group. The individual monitoring method is extended to supervisors and to people who are carrying out missions away from the main body of the formation; under this method of monitoring, dosimeters are issued to each person.

When there are no individual dosimeters, the exposure dose can be calculated according to the level of radiation and exposure time based on the formula:

$$D = R_{av} T$$

where D is the exposure dose, in R; R_{av} is the average level of radiation in the area in R/hr; and T is the exposure time in hrs.

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*The term "command" post (CCC), here and subsequently, also includes CD command and control centers (CCC).

The average level of radiation R_{av} is found by dividing the toal of all the radiation measurements by the number of measurements.

When calculating the exposure dose for people located in shelters, the shelter's gamma radiation attentuation factor is taken into account.

When located in a radioactive contaminated area, it is mandatory for CD formation commanders to monitor the exposure of formation personnel on a systematic basis.

After exposure in a contaminated area, dosimeter readings are taken, as a rule, in the area for personnel decontamination or at the assembly center. Dosimeter operators take the readings from the dosimeters, recharge them and return them to the people they are assigned to. The dosimeter readings are recorded in the record (Appendix 3). Personnel radiation exposure doses are recorded in the log (Appendix 4).

The individual exposure doses for formation personnel are counted regardless of the methods used for dosimetric monitoring: in a team (group), they are recorded for all personnel; at the facility CD headquarters, they are recorded for facility supervisors and formation commanders from team leaders and above. A group record of radioactive exposure is made to assess formation operational effectiveness (Appendix 5).

Formation commanders and facility CD staff submit reports on personnel exposure doses in accordance with the recurring reports schedule after they have accomplished their assigned missions. Radioactive exposure reports are submitted by: team chiefs to the facility CD staff for each of their subordinate units and by the facility CD staff to the rayon CD staff for the facility.

4. Procedures for Warning Residents about the Danger of Radioactive Contamination and Procedures for People Remaining in Contaminated Zones

When there is a threat of radioactive contamination in specific areas of a locality, the Radioactive Contamination Threat (RCT) signal is sounded. The purpose of this signal is to warn residents of areas threatened by contamination of the approach of the radioactive cloud and of the requirement to take immediate protective measures.

The RCT signal is transmitted by radio stations, radio relay nets, telephone and warning equipment. Moreover, the direction of the cloud's movement, the time of its approach to the given

populated area, expected levels of radiation and the protective measures required are reported. Livestock teams, shepherds and herdsmen (when livestock are being kept at pastures) and individual field teams are alerted at kolkhozes and sovkhozes in accordance with the warning and communications plan.

Individual protective gear is the first thing to be prepared and checked at the RCT signal. Steps are taken to seal up facilities and apartments (if this hasn't already been done): doors, ventilation panes, windows and chimneys are closed up tightly; openings are sealed with clay or paper is pasted over them; all holes in the floor, ceiling and walls are filled. Shelters, as well as vaults, basements and cellars which can be used to protect residents, are brought up to complete readiness. A stockpile of food and water for at least two days must be prepared in facilities where people will be sheltered. Water must be stored in tightly closed vessels and food must be wrapped in thick paper or packed in plastic bags and put in tightly closed cupboards, barrels, pans and other containers.

At the RCT signal, all field work ceases at kolkhozes (sovkhozes) and kolkhoz (blue and white collar workers) return to populated areas. Livestock facilities are sealed up; livestock are sheltered in buildings or in specially earmarked locations. If there are no livestock buildings at distant pastures, shepherds--who are warned of the radioactive cloud's movement--drive the herd to alternate pastures or drive livestock into the woods, ravines, quarries, recesses or under sheds. Improvised protective gear is made for valuable, breeding livestock: masks, boots and covers.

Stockpiles of loose feed are loaded in sealed warehouses, vestibules, feed preparation plants and storerooms. Feed in the field or on the farm's territory is protected by tarpaulins, synthetic films or a layer of branches or straw. Sheds are built over haystacks and, in the winter, a layer of ice is frozen over them.

Wells, elevated water towers and water tanks are sealed. Water stockpiles are set up in cisterns, tanks, barrels and tubs.

The /Radioactive Contamination/ (RC) signal is sounded by the facility CD staff or chief based on reconnaissance data and data from observation posts. The signal can also be issued centrally by the higher headquarters on the warning system.

At the RC signal, people immediately don their individual protective gear and, with their food and toilet articles,

they occupy the shelters. When there are no protective structures, people must be sheltered in residences and industrial facilities.

As the radiation situation is clarified, the CD staff adjusts the procedures for people's conduct in contaminated territory. The procedures selected depend on the level of radiation. The correct selection of procedures will make it possible to organize protection for people more efficiently and also to organize operations of the national economic facility more efficiently in the contaminated area.

In a zone of moderate contamination (radiation levels of 8-80 R/hr one hour after the burst), the area near the outer boundary of the zone is a radiation safe zone. In the middle of the zone, especially near its inner border, people must remain in fallout shelters for several hours; after this, they can return to normal buildings on the orders of CD elements. Cattle cannot be grazed for 0.5-3 days.

In a zone of severe contamination (radiation of 80-240 R/hr), people near the outer boundary and in the middle of the zone must be sheltered in protective structures for 10-24 hours; after that, they can proceed to ordinary buildings. Cattle cannot be grazed for 4-8 days.

In zones of dangerous contamination (radiation levels over 240 R/hr), people must remain in protective structures for 1.5 to 5 days or more. Moreover, they must continually remain in the protective structures for the first 1-3 days. Cattle cannot be grazed for 10-30 days.

Food can be ingested in areas with radiation levels below 5 R/hr. If the area is contaminated at higher levels of radiation, food must be eaten in the shelters or in decontaminated areas of the territory. Food must be prepared in an uncontaminated area or, in extreme cases, in an area where the level of radiation does not exceed 1 R/hr or does not exceed 5 R/hr when tents are used.

CHAPTER 4

WAYS AND METHODS TO INCREASE OPERATIONAL STABILITY AT NATIONAL ECONOMIC FACILITIES IN WARTIME

1. Stability of Operations at Facilities Under Wartime Conditions

When reviewing the issues of the operational stability of national economic facilities in wartime, the following definitions are accepted:

National economic facility--an industrial enterprise (plant, factory, etc.), organization, institution, educational institution, kolkhoz, sovkhoz;

Operational stability of a facility--the ability to produce the specified product types in the quantities and mix stipulated by wartime plans, as well as the ability to rapidly restore production which is interrupted as a result of the enemy's employment of weapons of mass destruction and other offensive weapons.

For service facilities (transportation, communications, etc.), operational stability means their ability to accomplish their functions under wartime conditions.

The reliability of a facility's operations in wartime depends upon the stability of many of its components. The latter's status is assessed by how vulnerable they are to the casualty-producing effects of a nuclear burst.

The shock wave of a nuclear burst causes destruction to buildings and structures and casualties among people and livestock. The casualty-producing effect of the shock wave is described by the value for the overpressure of its front Δp_ϕ which is measured in kg-force/cm^2.

Appendix 6 shows the shock wave overpressure values which describe the level of damage for various buildings, structures

and facility power network components. With this table, it is possible to assess the vulnerability of the basic components and of the facility as a whole when the shock wave is acting on them.

A center of nuclear destruction is divided into four zones depending upon the degree of damage to buildings and structures: complete, severe, average and slight destruction.

The zone of complete destruction is characterized by a shock wave front overpressure exceeding 0.5 kg-force/cm^2. Residential and industrial buildings, as well as fallout shelters and other structures whose degree of protection turns out to be lower than the overpressure values where they are located, are completely destroyed in this zone. Underground networks of the public utility system are destroyed or damaged. The entrances and exits to built-in blast shelters are obstructed. Conditions are favorable for large-scale fires due to the large number of obstructions. This zone is characterized by massive numbers of killed and wounded among the unprotected population.

The zone of severe destruction is formed at a shock wave front overpressure of 0.5 to 0.3 kg-force/cm^2. Buildings and structures are severely damaged in this zone; as a rule, blast shelters and the underground networks of the public utility system are protected. Local obstructions are formed as a result of the damaged buildings. The thermal radiation from the burst causes massive fires. This zone is characterized by significantly large numbers of killed and wounded among the unprotected population.

The zone of average destruction is characterized by a shock wave front overpressure of 0.3 to 0.2 kg-force/cm^2. Buildings and structures receive an average level of damage in this zone; blast shelters and basement shelters are protected. There are isolated obstructions. The thermal radiation can cause large-scale fires. The zone is characterized by large-scale medical casualties among the unprotected population.

The zone of slight destruction is characterized by a blast pressure of 0.2 to 0.1 kg-force/cm^2. The buildings within this zone are slightly damaged. The thermal radiation causes isolated fires. People outside of shelters in this zone may be injured by falling debris and broken glass.

The thermal radiation of a nuclear burst may also have a large effect on the stability of a facility and its components; thermal radiation is defined by the value for the light pulse measured in cal/cm^2. The values for light pulses at which certain combustible materials are ignited are shown in Appendix 7.

Secondary casualty-producing effects (fires, explosions of POL containers, contamination of the area by strong toxins, etc.) may result from the effects of the nuclear burst's blast wave and thermal radiation at the facility. Under certain conditions, the action of the secondary effects may exceed the direct casualty-producing effect of the blast wave and thermal radiation in size (for example, at facilities of the oil producing, oil refining, chemical and paper and pulp industries and at POL depots and depots and warehouses for strong toxins).

The other casualty-producing effects of a nuclear burst, specifically initial radiation and radioactive contamination, can have an effect on a facility's operational stability when people are killed and conditions impeding the facility's production activities are created.

2. Basic Measures to Increase the Operational Stability of Facilities

The basic measures to increase the operational stability of facilities are:

Protecting blue and white collar workers;

Increasing the stability of the production site (buildings, structures, power supply system, technical and machine tool equipment);

Preventing or limiting possible casualties (destruction) from secondary casualty-producing effects;

Setting up reliable materiel support and stable production liaison;

Conducting measures to reduce possible losses and to ensure stable production output;

Supporting reliable production management;

Making advance preparations to restore interrupted production.

Blue and white collar workers are protected by sheltering them in protective structures, dispersing them to the countryside and supplying them with individual protective gear.

It is necessary to take an individual approach to developing a list of measures promoting an increase in the stability of the facility's production site against the effects of the shock wave and thermal radiation by considering the importance of a particular component in continuing the facility's production activities and the economic feasibility of carrying out these measures.

An increase in the stability of the production site is achieved by carrying out measures like the following: burying equipment, pipelines and structures or putting them in non-collapsible, buried facilities; increasing the specifications for sturdy buildings and structures and increasing structural hardness by installing additional braces between individual components, by installing frames, supports, studs and braces and by reducing spans; conducting a number of other measures based on the special features of each specific facility.

A reliable supply of various types of power (electrical, natural gas, steam and heat) is highly significant in the overall system of measures to improve a facility's operational stability.

Operational stability within the power supply system is achieved by establishing several sources of electrical power for the enterprise. Provisions must be made to prevent gas, steam and water leaks in the natural gas supply network and the central heating system; provisions must also be made for backup lines and branches to transfer the power supply to other mains (including those from other facilities).

The probability of fires at the facility primarily depends upon the degree of fire resistance of buildings and structures, fire and explosion hazards, the density of development and the level of damage to buildings and structures by the nuclear burst's shock wave.

It is necessary to consider the facility's special features when developing measures to prevent or limit the effect of secondary casualty-producing effects on the facility and its components.

Thus, for example, facilities of the oil refining and petrochemical industries have, as a rule, a widespread network of pipelines, gas lines, tanks, etc. When the joints in these pipelines or in the components and fittings of the tank bodies are breached by the shock wave, conditions are created for the formation of dangerously explosive gas and air mixtures which, upon being ignited by fire or heated equipment surfaces, may explode and cause damage to equipment, construction sites, buildings and structures.

Strong toxic agents are stored or used at a number of national economic facilities. Chlorine, ammonia, phosgene, nitric acid, hydrochloric acid, sulfuric acid, alkalies (caustic soda, potassium, etc.) are the most widespread toxic agents. When tanks of these agents are destroyed by the shock wave, their vapors

may spread in the direction of the air stream and centers of contamination may form with a high concentration of toxic agents. The nature and scale of the dissemination of highly toxic agents depends upon a number of factors: their physico-chemical properties and storage conditions, the degree to which the containers are destroyed, terrain features, weather conditions, etc. Moreover, significant damage may be inflicted on other facilities and on residents of regions within the area of the highly toxic agent's casualty-producing effect.

To prevent and limit the possibility of fires, poisoning and other secondary casualty-producing effects from arising and spreading, fire prevention measures and technical engineering preventive measures are taken at facilities. They include: steps which hinder the spread of a fire (setting up fire breaks around hot stoves and equipment; erecting fire walls in shops where gasoline, lacquer and paint are used; putting POL depots and depots for highly explosive substances beyond the facility's territory; clearing the area of trash, etc.); putting banks around toxic chemical containers and depots and installing devices to neutralize them; supplying individual protective gear to workers in danger areas; preparing water reservoirs; and taking other measures based on the facility's special features.

When assessing the wartime operational stability of a facility, it is also necessary to take into account the facility's location in relation to areas of possible catastrophic flooding when dams within the hydro system are destroyed and it is necessary to consider the results of this destruction.

Radioactive contamination of the facility's territory and the adjacent area also has a significant effect on the level of the facility's operational stability. It is distinguished from the other casualty-producing effects of a nuclear burst by its long duration and it creates a threat to operating personnel. The casualty-producing effect of radiation exposure on people (as well as on all living organisms) is judged by the size of the exposure dose (R) and the length of time during which this dose was received; the shorter the time segment, the greater the casualty-producing effect of the same size dose on the human organism.

Specific, so-called human exposure doses are established by calculating doses of external gamma radiation which vary in length of time; these permissible doses do not lead to a noticeable exacerbation of human health or to a reduction in the ability to work, i.e., they do not cause human radiation sickness.

Therefore, when it is necessary to continue production activities at a national economic facility whose territory has been contaminated by radiation, appropriate operating procedures are developed for its personnel, procedures which preclude cases of people being exposed to doses exceeding the permissible doses.

The danger of radiation sickness for blue and white collar workers may bring about the requirement for a forced stoppage or limitation on production functions for a period of time until radiation levels decline to permissible standards which do not present any danger.

It is customary to describe the protective properties of industrial and residential buildings, structures, blast shelters and fallout shelters against radioactive radiation with the radiation attenuation factor K; mean values of attentuation factors are given in Appendix 8.

To a significant extent, a facility's operational stability during wartime will depend upon advance accomplishment of measures to provide materiel support to production. These measures include: reducing stockpiles of materiel to a minimum (on the facility's territory); setting up the necessary stockpiles and reserves of raw material, fuel, equipment, materials, intermediate parts, spare parts, etc., in the countryside; setting up reserves of machinery, construction parts and materials, mobile electric generators and compressors, tools, etc., in the countryside to conduct rescue and emergency recovery operations; preparing the facility to transition to backup (self-contained) electrical, steam and water supply sources; searching for possibilities of using local sources of raw materials, fuel, intermediate parts, spare parts and other materials required for production ahead of time.

Measures to reduce possible casualties and to ensure stable production output are important missions in solving the problem of the facility's operational stability during wartime. For this purpose, provisions are made in advance for: the organization and procedures for reliably protecting the work shift against weapons of mass destruction; a clear-cut daily routine considering the distribution of time for work, relaxation, eating and shift travel time from the countryside to the facility and back; measures to protect physical assets and to produce stockpiles of finished products; uninterrupted operations of the electrical, water and natural gas supply system; measures to prevent casualties from secondary effects; protection of technical documentation; reinforcement of security for the facility and for its most important individual components; instructions on a trouble-free shut down of production on the Air Raid signal.

In the list of measures to increase the stability of production output during wartime, provisions are made for shop interchangeability, for transferring production assignments to the same type of shop when several of them are put out of commission, for replacing combustible liquids with non-combustible liquids, etc.

Setting up a system in advance for controlling production, facility units and formations is an indispensible condition for ensuring any facility's stable and smooth operations during wartime.

A command post with communications equipment is set up in one of the blast shelters to ensure uninterrupted control of production activities and supervision of CD measures at the facility. Command and control is organized with due regard for the conditions which a facility may find itself in at the threat of an attack and during wartime (organizing the implementation of evacuation measures, changing facility operating procedures and others).

The facility command and control system must ensure efficient delivery of civil defense signals to work crews and also the accomplishment of measures to shelter people during Air Raid alerts and when transferring the shops of a facility with a continuous production process to a reduced operational mode which decreases the danger of industrial accidents and it must ensure uninterrupted supervision of the production process to produce the products planned.

After a nuclear attack, the command and control system must provide a capability for clear-cut command of facility CD forces and for coordinating their actions with formations of other facilities when conducting rescue and emergency recovery operations.

Advance preparations to restore interrupted production during wartime are important measures. These preparations will make it possible to reduce the time for restoration operations in the event the facility is partially destroyed.

A plan for restoration operations is developed based on an analysis of the possible extent of facility destruction resulting from an enemy nuclear attack and considering the probability of secondary casualty-producing effects and their effect on the facility. The feasibility of accomplishing restoration operations with the facility's own manpower and equipment is primarily taken into account when developing the plan; when these resources are not sufficient, provisions are made to use manpower and equipment from other organizations (in

coordination with local authorities). The required technical documentation is accomplished for the alternatives adopted to restore the facility.

3. Measures Conducted at the Facility During the Threat of an Enemy Attack and During Air Raid Alerts

The facility CD plan is implemented during the treat of an enemy attack. On the basis of this plan:

Construction begins to fill the shortage of blast shelters and fallout shelters and existing blast shelters are put into readiness to receive people being sheltered;

Preparations are made to disperse blue and white collar workers and to evacuate members of their families;

The area in the country is prepared to receive people being dispersed and evacuated and to protect them against weapons of mass destruction; appropriate evacuation measures are carried out when orders are received to disperse and evacuate;

Individual protective gear is issued to blue and white collar workers and to formation personnel;

All CD civilian formations are brought up to strength, completely outfitted and put on alert.

Other measures are also conducted to reduce possible casualties and to support the stability of the facility's production.

At the sound of the Air Raid signal:

The signal is duplicated by all warning and communications equipment (sirens, radios, telephones, etc.);

The facility ceases operations (with the exception of enterprises and shops with a continuous production process); blue and white collar workers take shelter in their designated blast shelter; specialists on alert remain at machines with a continuous production process; they are protected by individual shelters directly at work positions.

While defining measures to increase the facility's operational stability during wartime, it is necessary to study and analyze the material of research conducted for this purpose on a case by case basis with due regard for the special features of the facility's location and production activities.

CHAPTER 5

CITY (RAYON, FACILITY) COMMUNICATIONS AND WARNING SYSTEM

1. Organizational Missions and Principles of Communications and Warning

A command and control system is set up to ensure continual command of CD forces and to ensure timely accomplishment of all measures based on the CD chief's decisions; this system must provide him a capability to continually control the preparations and actions of his subordinate forces under any conditions.

Communications are the primary means of ensuring uninterrupted command and control of CD forces. National and departmental lines, centers and radio, radio relay and wire communications sets--as well as organic technical communications equipment of CD staffs, mobile equipment and signal devices--are used to set up and support communications.

The operating communications system must be kept in constant readiness for operations and it must provide timeliness, security, speed and reliability in transmitting and receiving information.

Constant readiness and reliability in communications are achieved by:

Setting up communications centers at command and control centers in advance and maintaining them in constant operational readiness;

Making comprehensive use of all communications facilities and establishing backup manpower and equipment;

Conducting measures to improve the survivability of communications centers and links in wartime;

The ability of staff, operational service support branches and formation officials to correctly use communications facilities and to conduct their conversations via technical communications facilities briefly and precisely;

Conducting restoration operations at communications centers and links within short deadlines when they are out of commission;

Providing reliable protection against the effects of weapons of mass destruction for personnel maintaining communications facilities.

Radio, wire, mobile and signal equipment are used to set up communications.

Radio facilities are one of the primary means of command and control and, in a number of cases, they are the sole means. They make it possible to quickly establish communications at long distances and to maintain them in the most difficult situation.

Wire facilities are also used on a widespread basis at all CD command and control levels, both in peacetime and in wartime.

Mobile communications facilities are used to deliver documents and to transmit oral orders, reports and information, especially during rescue and emergency recovery operations. Aircraft, helicopters, motor vehicles, ships, cutters, motorcycles, railroad handcars and other transportation equipment can be used in this capacity.

Signal equipment is used to warn residents and also as backup facilities to transmit CD commands and signals. Signal equipment includes electric and manual sirens, flares and flags.

The warning system for residents means the totality of methods and means for getting CD signals to them. Warning is organized on the basis of instructions from the appropriate CD chiefs and senior staffs; centralized warning systems, radio relay nets and sirens are used for warning purposes.

2. The Role and Place of CD Staffs and Command and Control Elements Within the Communications and Warning System

The staff organizes the accomplishment of all CD measures and it is the primary element which provides command and control of CD forces. It is responsible for organizing and setting up stable communications and warning. A loss of communications leads to a loss of command and control; therefore, a very important duty of the CD staff is to organize communications on a timely basis and to continually maintain their uninterrupted operations.

The staff organizes communications and warning based on the CD chief's decision and the higher headquarters communications instructions. The CD chief-of-staff exercises overall control of communications. He must know the status and capabilities of communications forces and facilities, issue missions to organize communications in a timely manner and issue communications instructions to subordinate headquarters.

A communications support service is established to directly organize and provide communications and warning in a city (rayon, at a facility). The chief of this service is responsible for the communications and warning system's planning, organization and constant readiness. He must:

Have a good knowledge of the procedures for organizing communications and warning and of subordinate formations' capabilities and degree of readiness;

Develop a communications and warning plan and report his communications proposals to the CD chief of staff;

Provide communications to the staff and formations under diverse conditions;

Monitor the timeliness with which documents, orders and signals are transported (delivered);

Organize repair of communications equipment in a timely manner;

Take immediate steps to restore communications when they are lost or there are none.

3. Organizing Communications and Warning in a City (Rayon, at a Facility)

Communications in a city (rayon, at a facility)--as well as in the blue and white collar workers dispersal areas--are organized on the basis of the communications centers, stations and links which exist in peacetime and also on the basis of the CD staff's organic communications equipment.

The CD communications system /within a city (rayon)/ must be uniform. This is achieved by planning and controlling communications on a centralized basis and by making comprehensive use of all existing manpower and equipment, including alternative channels of communications.

The city (rayon) communications support service must provide reliable communications between the CD chief and his subordinate CD chiefs and support services, between him and higher CD chiefs and staffs and between him and lateral CD chiefs and staffs. The city (rayon) communications support service also provides warning to city (rayon) officials and residents on the threat of an enemy attack, the danger of radioactive contamination,

the enemy's employment of chemical and biological weapons and the onset of natural disasters.

Radio communications, the telephone network, radio relay centers and dispatcher communications are used to communicate within the city and rayon.

The telephone network and radio communications must provide the city (rayon) CD chief with the capability to exercise command and control over his subordinate CD chiefs and support services, territorial formation commanders, reconnaissance elements, evacuation assembly centers and resident evacuation and dispersal embarkation stations.

The CD chief also uses these facilities when organizing communications with senior and lateral CD chiefs and staffs.

/Communications at a national economic facility/ are organized by the communications support service which is set up at the facility communication center's (station's) facilities. This service must provide wire communications for the facility CD chief and his staff, the ministry (department)--along a dedicated system; with the city (rayon) CD chief, the city (rayon) ATE [automatic telephone exchange], facility observation and reconnaissance posts, shop and department chiefs located at their work positions outside the command and control center and with facility CD support services--via direct communications.

Radio communications are organized at the facility in addition to wire communications. As a rule, a radio net for the facility CD chief is established; it includes the formation commander's radio stations and the reconnaissance radio net which is made up of the reconnaissance group commanders' radio stations. The facility CD chief's radio station is included in the city (rayon) CD chief's radio net.

The mobile communications equipment at the disposal of the facility CD chief is used as a backup means of communication in the most important sectors supported by technical communications facilities and as the primary means of communications in sectors where there are no technical communications facilities.

The city (rayon) CD staff provides warning information on the situation to the facility CD chief and his staff. In turn, the facility sets up its own warning network in advance and equips it with the necessary technical equipment; this system must provide timely warning to supervisors, CD formations, blue and white collar workers and members of their families on the threat of an enemy attack, the danger of radioactive

contamination, the enemy's employment of chemical and biological weapons and on natural disasters.

An on-duty and off-duty warning plan is developed to provide timely warning to facility supervisors, commanders and chiefs.

Warning is provided to formation personnel and the rest of the residents on the threat of an enemy attack and the employment of weapons of mass destruction by sounding the prescribed CD signals using all existing communications facilities, public address systems and signal equipment.

Electric sirens, the radio relay net and internal telephone communications are used to warn personnel of the facility work shift. Using all the means at their disposal, enterprise, organizational and apartment management office supervisors organize warning for people at their place of residence.

A communications system is set up in advance in the blue and white collar worker dispersal areas /in the countryside/; this system must provide communications with the facility command post, the city (rayon) and rural area CD chief, chiefs of support services and formation commanders.

As a rule, communications in the countryside are handled on existing, dedicated rayon communications links. In isolated cases, the facility CD chief's communications with formation commanders may be provided along battle cable communications links which are deployed by a facility communications team. Radio and mobile facilities are used when wire communications facilities are put out of commission.

Warning is provided to CD staffs, forces and facilities in the countryside at flash override on all existing communications facilities.

During a march, communications and warning are provided for formation personnel on the facility CD chief's radio net and by mobile and signal communications gear. In addition, they are handled over the telephone loudspeaker sites located on the formation march routes.

When conducting rescue and emergency recovery operations in centers of destruction, communications are handled by radio, mobile and signal equipment and also by battle cable links until fixed communications links and centers are restored.

CHAPTER 6

ORGANIZING AND CONDUCTING RECONNAISSANCE IN CENTERS OF DESTRUCTION (CONTAMINATION) IN A CITY (RAYON, FACILITY)

1. Missions and Requirements Levied on Reconnaissance

Reconnaissance is the most important type of CD force support operations. It is conducted to obtain timely data on the situation which has resulted from the enemy's employment of weapons of mass destruction. Reconnaissance data are used to make decisions for conducting measures to protect residents and for organizing and conducting rescue and emergency recovery operations in centers of destruction (contamination).

Continuity, aggressiveness, dedication to the mission, timeliness and reliability are the basic requirements levied on reconnaissance.

Continuity in reconnaissance is achieved by conducting it during all phases of formation operations, day and night, under any conditions, in any terrain and in any weather.

Aggressiveness in reconnaissance consists of steadfast attempts by chiefs (commanders) and staffs with all their forces, means and methods to obtain the data on the situation required to organize CD force operations.

In reconnaissance, dedication to the mission consists of strictly subordinating basic reconnaissance measures to the interests of ensuring accomplishment of the primary mission.

Timeliness in reconnaissance consists of obtaining and transmitting required information on the situation precisely within established deadlines.

Reliability of reconnaissance data is established by obtaining it from various sources, thoroughly analyzing and comparing it and, when necessary, rechecking and updating reconnaissance.

Reconnaissance is conducted by all military units, civilian formations and CD support services by observing and directly inspecting an area and various objectives using NBC reconnaissance devices.

The primary missions of reconnaissance are:

Establishing the time that the enemy employed weapons of mass destruction and the types of weapons;

Determining the status of CD force march routes to a center of destruction (contamination), the existance of obstacles on them and routes for going around them;

Determining the level of damage in a center of destruction (contamination), the presence of fires and obstructions and routes and directions for getting around them (negotiating them); searching out blast shelters and shelters and determining the status of people located in them and the conditions for providing assistance to casualties;

Discovering sectors of radioactive and chemical contamination and infectious disease centers in a timely manner; defining their limits, levels of radiation, type of toxic (poisonous) agents and type of pathogenic agents;

Conducting continual observation and laboratory monitoring of changes in the NBC situation in areas where residents are located, on formation march routes, in centers of destruction (contamination) and at objective areas for rescue operations.

The accomplishment of assigned reconnaissance missions is achieved:

By a high level of preparedness among reconnaissance formation personnel and by supplying them with reconnaissance devices, individual protective gear, communications equipment and transportation;

By clear-cut reconnaissance planning and organization, by concentrating their primary efforts in the most important sectors and by stable command and control of their operations;

By a constant high state of readiness among reconnaissance forces to accomplish their missions under any conditions;

By establishing reliable communications with reconnaissance formations and by organizing coordination among them by time and place of operation;

By setting up reserve reconnaissance forces.

2. Types of Reconnaissance

Depending upon the methods for obtaining situation data and the manpower and resources allocated for this purpose, reconnaissance is divided into aerial, river (naval) and land reconnaissance.

/Aerial reconnaissance/ is the most mobile type of reconnaissance. It obtains more accurate information on the epicenters of nuclear bursts; it establishes the extent of destruction and fires, the status of roads and road facilities and locations of obstructions on formation march routes and in centers of destruction; and it determines the radiation levels and borders of contaminated areas in centers of destruction and in the path of radioactive clouds.

The data is transmitted by radio from the aircraft (helicopter) to the CD staff which delivers the data to all its subordinates. In addition, subordinate CD staffs can receive aerial reconnaissance data independently using radio receivers.

/River (naval) reconnaissance/ is designed to assess the situation in a coastal area and at river (naval) fleet facilities. It is organized by the CD chief.

/Land reconnaissance/ is divided into general and special (CD support services) based on the nature of the missions being accomplished. General reconnaissance is accomplished by CD military reconnaissance units, observation and laboratory monitoring centers, CD reconnaissance groups and general purpose formation reconnaissance teams of cities, urban areas, rural areas and national economic facilities. Special reconnaissance is conducted by radiation and chemical observation posts and by radiation and chemical reconnaissance groups organized by the radiation and chemical defense support services and also by engineer and disease-control reconnaissance groups, veterinary and plant pathology teams and other types of reconnaissance teams.

All CD staffs organize land reconnaissance.

2. Organizing and Conducting Reconnaissance in a City (Rayon, Facility)

Organizing reconnaissance is a very important duty of CD chiefs and their staffs at all levels.

The CD chief assigns the reconnaissance mission. He designates the reconnaissance goal, the sector for primary reconnaissance efforts and what manpower and resources will be used for this purpose as well as the nature of the reconnaissance data and deadlines for submitting them.

The city (rayon, facility) CD chief of staff organizes reconnaissance and is completely responsible for it. The deputy chief of staff directly organizes reconnaissance measures. Guided by the CD chief's decision and the chief of staff's instructions, he plans reconnaissance, makes preparations and

sends out reconnaissance formations; he collects, analyzes and summarizes reconnaissance data. The CD staff submits reports on the reconnoitered situation in a center of destruction to the CD chief and to higher headquarters; it also keeps subordinate staffs, chiefs of support services, formation commanders and adjacent units informed.

The reconnaissance plan (Appendix 9) is the basic document for organizing reconnaissance; it is developed by the city (rayon, facility) CD staff. The plan indicates: the reconnaissance goal; the manpower and resources allocated to conduct reconnaissance, the procedures and deadlines for alerting them and their distribution among reconnaissance sectors and objectives; reconnaissance missions (objectives) and methods and deadlines for accomplishing them; communications equipment and procedures for reporting reconnaissance results; and reserve manpower and resources for reconnaissance. The reconnaissance plan is developed in advance and up-dated consistent with the current situation when the threat of an enemy attack is declared.

A map of the area around the city (rayon, facility) and a large-scale city (rayon, facility) map are attached to the reconnaissance plan. The following is entered on the area map: command posts, dispositions of reconnaissance formations in ready areas in the countryside, dispositions of radiation and chemical observation posts, reconnaissance formation march routes and their assembly areas upon accomplishment of their missions and the direction of travel of the reconnaissance reserves. The following data is entered on the city (rayon, facility) map: national economic facilities, protective structures (and their capacity), operational sectors of reconnaissance formations at facilities and other necessary data.

The city (rayon, facility) CD chief approves the reconnaissance plan.

The CD chief of staff issues reconnaissance orders in accordance with the reconnaissance plan; these orders provide brief information on the situation, reconnaissance missions, manpower and resources allocated, methods and deadlines for accomplishing missions and procedures for submitting reports.

Radiation and chemical observation posts, CD reconnaissance groups, CD support services reconnaissance groups and teams and general purpose formations are used to conduct reconnaissance in a city, in an urban area and at national economic facilities.

All CD staffs (city, rayon, national economic facilities) set up /radiation and chemical observation posts/ when there is a threat of an enemy attack.

The primary mission of the radiation and chemical observation post is to quickly determine the onset of radiation and chemical contamination, conduct continual observation of changes in the radiation and chemical situation and report this to the CD staff.

The following is indicated when assigning a mission to a post: its location, its zone or area of observation, what it should pay special attention to, operating procedures during an enemy attack and when contamination is detected, procedures for reporting results and procedures for issuing warning signals.

After receiving his mission, the chief of post establishes observation procedures and constant communications with the chief who set up the post. The post is located in a specially prepared facility in an area which provides a good field of view. Observation is conducted visually and with radiation and chemical reconnaissance devices.

During an Air Raid alert, the observers take shelter in a protective structure; after the enemy has delivered a nuclear strike and the shock wave has passed, they leave the shelter and continue their observations, periodically turning on the radiation reconnaissance device. Upon detecting radioactive contamination, the chief of post immediately makes a report to the chief who set up the post and, based on his instructions, he issues a warning signal and commands his personnel to: "Put on protective gear."

When chemical contamination is detected, the chief of post orders post personnel to put on protective gear, issues a warning signal on his own and immediately reports the observation results to the chief who set up the post.

/Reconnaissance groups (teams)/ are sent out to reconnoiter the situation on a CD march route to a center of destruction and in the center itself.

A CD reconnaissance group consists of a group leader, a 3-man communications team and 3-man reconnaissance teams. It is equipped with reconnaissance devices, individual protective gear and communications equipment and it is provided transportation.

Facility laboratories, design departments and other establishments whose blue and white collar workers are able to be quickly trained to conduct reconnaissance using technical gear are the foundation for setting up the reconnaissance group.

The number of reconnaissance groups set up in a city or rayon is determined by the size of the area and by the city's (rayon's) other special features. It is also taken into account that reconnaissance must be conducted within short deadlines and, as a rule, one team conducts reconnaissance in an area of 2-3 blocks; in some cases, the reconnaissance area can be up to 800 m. Reconnaissance groups are set up at facilities based on the estimate that one team can conduct reconnaissance of three buildings located a maximum of 500 m from each other or of two buildings located at a greater distance.

The reconnaissance group leader is assigned a mission to conduct reconnaissance near the group's disposition (assembly area) and, when necessary, the mission is updated as the group approaches the center of destruction. The following is usually indicated when a mission is assigned: brief data on the situation; the march route, initial point and time for passing it; the essential elements of information and the deadline for submitting them, what should be reconnoitered in a center of destruction and what should have special attention directed at it; procedures for reporting reconnaissance results; the maximum exposure dose for scouts; and the assembly point after the mission has been accomplished.

After receiving his mission, the group leader delivers it to his personnel and he checks the group's readiness to accomplish the mission. The group begins moving out of its location (assembly area) with enough time to pass the initial point by the prescribed time.

While on the move, reconnaissance group personnel periodically turn on their dosimeters and take air samples for toxin contamination. Upon detecting radioactive (chemical) contamination, the scouts determine the radiation levels (type of toxin) and the leader immediately submits a report to the chief who sent out the reconnaissance group.

As a rule, the reconnaissance group skirts zones with severe radioactive contamination and chemical contaminated areas; when it is not possible to skirt an area, they negotiate it at the highest possible speed; personnel use their individual protective gear.

The reconnaissance group marks the borders of contaiminated areas and routes for skirting or negotiating them with signs and markers which can be easily seen. Moreover, it is mandatory to set up signs and markers on a border with a radiation level of 0.5 R/hr (based on the leader's instructions--and at borders with other, higher radiation levels) and on borders of areas contaminated by toxins.

The operational tactics of a city (rayon) and national economic facility reconnaissance group in a center of destruction (contamination) have certain special features. While skirting or negotiating obstacles, the city (rayon) reconnaissance groups measure the radiation levels (determine the type of toxin), determine the nature of destruction, the locations of large-scale fires and, without any delay to conduct a detailed inspection of the objectives for rescue operations, they swiftly advance to the final reconnaissance point. While moving along their designated routes, national economic facility reconnaissance groups determine the radiation levels (type of toxin), look for protective structures, determine their status and establish the easiest approach routes to them, determine the location of casualties and the conditions for rescuing them, determine the nature of obstructions and fires and the degree of destruction or damage to buildings, industrial structures and public utility systems. They look for protective structures using a small survey map with orientation points and using surviving markers and other signs. Easily seen signs are used to mark the locations of casualties, protective structures and approach routes to them, as well as radiation levels and other elements which are dangerous to people.

The reconnaissance group leader reports his reconnaissance results to the chief who sent out the reconnaissance team. In the report, he briefly indicates when, where and what was detected, where the group is located and what missions it is accomplishing and his decision for future operations.

Upon accomplishing its mission, the reconnaissance group proceeds to the assembly point and conducts partial decontamination of personnel and devices. Depending on the situation, the group subsequently prepares to accomplish a new mission or it is sent to a special decontamination center for complete personnel decontamination and then proceeds to a rest area.

At the order of the chiefs of support services, CD support services reconnaissance groups (teams) are moved forward to a center of destruction (contamination) to obtain more precise data on the level of NBC contamination of the land, air, water sources, feed and forage, as well as to determine the fire, medical, engineer and veterinary situation. They move forward with traffic support detachments or on their own behind military unit reconnaissance elements or behind city (rayon, facility) CD reconnaissance formations.

When necessary, radiation and chemical observation post personnel and reconnaissance group personnel can be used to monitor the radioactive contamination of people, equipment, personal belongings, food and water.

CHAPTER 7

ORGANIZING RESCUE AND EMERGENCY RECOVERY OPERATIONS AT A FACILITY

1. The Nature and Possible Extent of Rescue and Emergency Recovery Operations in a Center of Nuclear Destruction

An area where large-scale destruction to buildings (structures), fires and radioactive contamination are caused by the operation of the casualty-producing effects of a nuclear burst is called a center of nuclear destruction; there may be large-scale casualties among residents not sheltered in protective structures. The outer border of a center of nuclear destruction is an arbitrary line where the nuclear burst shock wave overpressure is 0.1 kg-force/cm^2.

The size of a center of nuclear destruction and the scale of destruction and casualties depend upon the yield of the nuclear weapon, the type of burst, the layout of the populated area, the nature of its development, terrain features, the possibility of secondary casualty-producing effects and the level of civil defense preparedness among the residents and facilities.

When determining the possible nature of destruction and the extent and conditions for conducting rescue operations, the center of nuclear destruction is arbitrarily divided into four zones in relation to the size of the shock wave front overpressure--complete, severe, average and slight destruction. The relative areas of the zones of destruction are: complete--13 percent, severe--10 percent, average--15 percent and slight--62 percent.

The nature of rescue and emergency recover operations in a center of nuclear destruction has its own special features in each of these zones.

The main types of rescue and emergency recovery operations will be:

a) In a zone of complete destruction--making passages through obstructions; putting out isolated fires in areas where rescue operations are being conducted; digging out and uncovering obstructed blast shelters and shelters and providing air for them when necessary; extracting people from obstructed blast shelters and shelters and providing aid to the injured; restoring individual sections of the water and electrical supply systems to provide water and electrical power for rescue formations and victims;

b) In a zone of severe destruction--putting out fires; extracting people from obstructions in damaged and burning buildings; digging out and uncovering obstructed blast shelters and shelters and providing air for them when necessary; making passages; knocking down walls and building frames which are in danger of collapsing;

c) In a zone of average destruction--putting out fires, clearing entrances to protective structures, extracting people from obstructions and from damaged and burning buildings;

c) In an area of slight destruction--putting out isolated pockets of fire; rescuing people from burning buildings and providing aid to the injured.

2. Organizing and Conducting Rescue and Emergency Recovery Operations at a Facility in a Center of Nuclear Destruction

Rescue and emergency recovery operations at a facility in a center of nuclear destruction must begin as quickly as possible after the center has formed and they must be conducted on a continuing basis until completed.

Facility CD formations are alerted for operations when the threat of an enemy attack is announced. Moreover, the composite detachment (detail) moves out to the countryside while the support service formations remain with their work shifts.

The facility CD chief is responsible for warning and assembling formation personnel, supplying them with protective gear, transportation and tools and also dispatching formations to the countryside.

The dislocations and alerting of formations in the countryside to conduct rescue and emergency recovery operations and the procedures for warning, assembling and moving them to a center of destruction are planned in advance and reflected in the facility CD plans.

After the enemy has delivered a nuclear strike, the city (rayon) CD chief gives an order to the facility CD chief to move formations out to a center of destruction and to conduct rescue and emergency recovery operations.

Upon receiving the order, the facility CD chief refines the mission, assesses the situation, makes the decision to conduct rescue and emergency recovery operations, organizes reconnaissance and assigns formations the mission to move out to a center of destruction.

While assessing the situation and making his decision, the facility chief must consider the nature and scale of destruction, the possible number and location of injured, the degree of damage to structures and engineer networks, the status of his subordinate forces and resources, the actions of adjacent units, weather conditions, season and time of day.

The facility CD chief defines the following in his decision to conduct rescue and emergency recovery operations: the overall concept for accomplishing the forthcoming operations and the sectors where the main efforts must be concentrated and where operations must be undertaken first; the missions for formations and support services; manpower and resources attached to the main formation; procedures for coordination among formations; procedures for providing first aid and for carrying out, evacuating and disposing of the injured; and command and signal.

When assigning missions to formations to move out to a center of destruction, the facility CD chief provides: brief information on the situation; march route; each formation's location in the column; the initial point, the time for passing it and the time of arrival within the designated area; and procedures for maintaining communications.

A reconnaissance group is dispatched to conduct reconnaissance along the formation march route and at the facility.

The facility formations usually move out to a center of destruction in a single column. The traffic support detachment moves at the head of the column immediately behind the reconnaissance team; when necessary, it clears paths and passages for the column through obstructions and it sets up river crossings while moving along the column's designated route.

The formations' column march route formation must correspond to the situation which has developed as a result of the enemy's employment of nuclear weapons and the situation which

the formations will encounter on approaches to the facility and directly at the facility itself (fires, obstructions, destruction and contamination). The formations which will be committed to the center of destruction (to the operational objective) first and which will clear the way for the rescue details and medical teams must be at the head of the column formation. These formations are: firefighting, mechanized work, decontamination and emergency equipment formations.

The facility CD chief usually travels at the head of the formation's column and directs their movement, primarily using signals; communications with the reconnaissance team, the facility and the senior chief are handled by radio.

Established procedures, speed and intervals must be strictly observed during the march.

Upon completing the march, contaminated sectors are skirted or negotiated from the march in protective gear. Radioactive contaminated zones are negotiated along routes with the lowest radiation levels, at increased speed and with increased intervals between vehicles. As a rule, chemical contaminated sectors are skirted; when it is not possible to skirt them, they are negotiated after passages have been decontaminated when possible. After radioactive and toxic contamination areas are negotiated, partial personnel decontamination is conducted.

While on the move to a facility, the command and control group collects and summarizes the data received from the reconnaissance group on the situation at the facility; based on this data, the facility CD chief makes adjustments to his decision to conduct rescue and emergency recovery operations.

When the formations are approaching the facility, the CD chief issues an oral operations order to conduct rescue and emergency recovery operations; this order provides: brief information on the situation at the facility (radiation level, extent of damage to buildings and protective structures, the existence of pockets of fire and other data required by personnel to carry out rescue and emergency recovery operations); the sectors (objectives) for recovery operations; the beginning and end of operations; personnel protective measures; permissible exposure doses and procedures for setting up dosimetric monitoring; procedures for providing first aid and for carrying out the injured; sites for loading injured on vehicles and locations of aid stations and routes for evacuating the injured; the location of the command post and procedures for maintaining communications.

Upon receiving their mission, formation commanders lead their elements to their assigned operational sectors (objectives).

When there are passageways, the formations move to the rescue and emergency recovery operations sites in vehicles; when vehicular movement is not possible due to obstructions, they move to the sites on foot. Passages are cleared in obstructions for equipment to move to operations sites.

The facility formation reconnaissance groups (teams) which have arrived in the center of destruction obtain more precise information on radiation levels on the facility's territory, the status of protective structures and the presence of obstructions and pockets of fire on the facility's territory; and they inspect damaged buildings.

After arriving at the operational sector (objective), formation commanders obtain more precise information on the situation and set up rescue operations. First, fires are localized and extinguished in the future operations sectors; obstructed and damaged protective structures are dug out and uncovered; a search is conducted for the injured and they are extracted from obstructions, damaged buildings and burning buildings; first aid is provided to casualties and they are evacuated to the countryside.

Until equipment arrives at the rescue and emergency recovery operations sites, rescue formation personnel look for casualties and clear away obstructions by hand and using portable tools while the medical teams provide first aid to casualties. At the same time, sites are prepared to set up truck-mounted cranes, excavators, compressors and other specialized machinery.

The successful conduct of rescue and emergency recovery operations must be supported by localizing and extinguishing fires in the center of nuclear destruction. For this purpose, the fire-fighting service's primary forces and resources must be concentrated in the most dangerous sectors where there is a danger that fires will spread quickly and, primarily, where people's lives are threatened by fire: in industrial buildings and co-located facilities, near entrances and exits to protective structures and on routes for evacuating casualties and in highly explosive areas which can exacerbate the firefighting situation.

Fires are primarily extinguished by powerful streams of water and also with liquid, foam, carbon dioxide and dry powder fire extinguishers and with sand, cinders, dry clay, dirt and other dry materials. Electrical equipment and burning electric lines are extinguished with carbon dioxide; they can only be extinguished

with water after they are disconnected. Burning industrial oil is extinguished by covering the oil containers with lids and also using foam fire extinguishers and dispersed streams of water. Streams of water should not be directed at expanded metal while it is cooling--this may cause expanded parts to fly off.

When natural gas is ignited, the flame is extinguished after the pressure in the gas line is reduced first. The flame is covered with sand or dirt or a wet tarpaulin or other material is thrown over it. At the same time that fires are being extinguished in oxyacetylene welding shops, the gas tanks are cooled off with water to prevent an explosion and they are removed from the premises.

When there is a fire in boiler rooms, the boilers are left alone and the steam is vented through the outlet system or into the atmosphere.

The rescue details (groups) rescue people from damaged and burning buildings where the entrances and stairways have been destroyed; people are led out and the injured are carried out through openings made in adjoining buildings which have undamaged exits or via ladders constructed for this purpose and also through windows and balconies using stairways, automatic hoists and rescue ropes.

In conjunction with bulldozer-excavator and crane-compressor groups (teams), the rescue details (groups) dig out and uncover obstructed blast shelters and other protective structures. They do this using one of the following methods: clearing rubble away from the emergency exit cap or hatch; knocking down obstructions near the building's outer wall over the emergency exit gangway; knocking down obstructions over the main entrance and subsequently opening the blast shelter's protective door; knocking down obstructions near the building's outer wall and subsequently digging a passage way in the ground and punching a hole in the blast shelter's wall; punching a hole in the blast shelter's wall from an adjacent building; and knocking down obstructions over the blast shelter's roof and subsequently punching a hole in it to bring people out.

First aid is immediately provided to the injured on the spot where they are found by medical team and rescue detail personnel; it includes stopping bleeding, putting on bandages, making limbs immobile when bones are broken, artifical respiration and other measures. Stretcher teams--allocated from rescue detail (group) personnel--carry the injured to areas where they are loaded on vehicles.

(The problems of rescuing people from burning and damaged buildings, uncovering obstructed blast shelters and shelters and providing first aid to the injured are covered in more detail in Chapter 8.)

During rescue operations, it may be necessary to conduct emergency recovery operations to localize water, natural gas, heat and electrical supply system damage which presents a threat to people's lives or which is impeding rescue operations and firefighting; emergency recovery operations may also have to be conducted to reinforce or knock down building frames which are in danger of falling down or which are hindering traffic and rescue operations and also to repair and temporarily restore damaged or destroyed communications lines, sewage systems and other industrial systems.

For this purpose, rescue teams (groups) and teams for sealing off centers of contamination--these teams are reinforced with the necessary equipment and machinery--move out to the accident sites, search for and turn off the damaged sections of the systems or eliminate the damage at the accident sites. To prevent flooding of areas where people are located, water is drained off into ditches and sewers.

To prevent explosions and fires when industrial pipelines are destroyed, the pipelines leading to reservoirs and industrial equipment are capped first and then all the pumps maintaining pressure in the pipelines are switched off.

During rescue and emergency recovery operations, the CD chief and his staff direct formation operations, supervise accomplishment of the assigned missions and supervise coordination between them; they assign new missions to formations or up date previously assigned missions; they reallocate manpower and resources to achieve the greatest efficiency in their operations; they organize dosimetric monitoring and observation of changes in radiation levels; and they provide comprehensive support to formations and relieve them in a timely manner.

Formations are relieved when personnel have received the established permissible exposure dose or when their prescribed work period has expired. As a rule, relief is conducted without stopping operations. The staff calls up the next operational relief based on the facility CD chief's orders.

When the relief arrives, the respective formation commanders exchange information on the situation and on the assignment of manpower and resources within the operational sector. After becoming familiar with the situation, commanders of newly arrived formations assign missions to their subordinates and direct their

operations. As a rule, the equipment and tools of the relieved formations are turned over to the relief.

When necessary, relieved formations are taken to personnel decontamination centers and then to designated areas to rest, eat and prepare for subsequent operations.

CHAPTER 8

RESCUING PEOPLE UNDER OBSTRUCTIONS AND IN DAMAGED AND BURNING BUILDINGS

1. Determining the Location of People in Obstructed, Damaged and Burning Buildings

In a center of nuclear destruction, people may frequently be found in destroyed and partially destroyed buildings or under obstructions formed by debris from the buildings and in empty spaces in obstructions.

Search and rescue operations begin immediately after civilian formations arrive at the objective area for rescue operations.

The search should primarily begin with basements that have not been modified to shelter people, various holes and roadside structures (culverts, ditches), outside windows and staircases and the areas near the walls on lower floors (outside and inside). It is advisable to search for casualties by thoroughly combing an area with completely or partially destroyed buildings.

While conducting the search, it is necessary to move at intervals which ensure constant visual and audio contact and which ensure the possibility of visually covering the entire area being combed. In areas where casualties are possibly located, it is necessary to periodically stop, shout to them, give signals by tapping on parts of the obstruction and parts of the building which were not destroyed and listen attentively to every sound which may be an answering signal from the injured. If it is established that there are people under the obstructions, it is necessary to attempt to establish contact with them by talking or tapping in order to find out their number and status.

The search for people in damaged buildings should begin with a visual inspection of the building itself to determine the condition of outer walls and protruding parts of the building (balconies, ledges) and also stairwells, flights of stairs and landings. During the inspection, it is necessary to bear in mind that individual parts of the building may collapse a long time after the explosion. Therefore, walls and other parts of a destroyed building should be approached cautiously.

It is recommended that interior parts of a building be inspected in the following sequence. At first, it is necessary to inspect the condition of the inside, supporting walls, pillars and partitions; then, it is necessary to determine the location of victims and possible ways of evacuating them from the building. Highrise buildings should be inspected from the lower floors so it will be possible to take the necessary steps to reinforce damaged frameworks when necessary.

It is very difficult to search for people in burning buildings. Burning buildings should be searched quickly while observing precautionary measures. The door to a smoke-filled room must be opened cautiously since a quick influx of air may cause the flame to flare up. It is better to crawl through a severely smoked-filled room. The search for people in burning and smoke-filled rooms is conducted by shouting for them. It is necessary to make an especially thorough search for children; from fear, they will hide in the most unexpected places.

The locations of victims in obstructions and partially destroyed buildings are marked with special signs or with signs improvised from materials at hand.

2. Methods for Rescuing people from Obstructions and from Damaged and Burning Buildings and Providing First Aid to the Injured

Methods for extracting people from obstructions depend upon the height and condition of the obstruction. The least labor intensive method which ensures the safety of the people under the obstruction is selected.

The smouldering debris from a destroyed building presents a great deal of danger to the victims. Combustion is accompanied by the formation of carbon monoxide which may asphyxiate the people under the obstructions as well as the rescuers. Therefore, it is first necessary to extinguish smouldering and burning objects.

Before extracting the victims from obstructions, it is necessary to take steps to eliminate possible cave-ins of individual structures in partially destroyed buildings; these cave-ins are dangerous to the victims and to the people conducting rescue operations.

Beginning from one of the sides, it is necessary to make passages through the obstruction in order to rescue people under it. When making passages, the empty spaces which are usually between the caved-in parts of a building should be used first. Passages can only be made between large heaps when the heaps are tightly compressed and will not tip over or cave in from the vibrations caused by crowbars, sledge hammers and other tools. At first, the passage is made large enough to crawl through and then it is expanded to the size required to free the victims.

Upon arriving at the victim, everything that might interfere with pulling him out is cleared away. Small debris, rubble, trash and other dry material are cleared away from the victim's body by hand since additional damage can be inflicted on the victim by using tools. When digging a victim out, it is necessary to free his head and chest first.

In a number of cases, horizontal or inclined tunnels are made through the layers of debris to extract the injured. The direction of the tunnel passages are selected based on the shortest distance using empty spaces in the obstruction and using areas consisting of wood frame debris or small stone debris. The tunnels are made at least 1 by 1 m in size. Based on local conditions or the nature of the obstruction, the cross-section can be reduced in certain places to the extent that victims can be brought through.

Props made from previously manufactured parts or from the material at hand in the obstructions (metal and wooden beams, pillars, etc.) are set up in the tunnel passage to prevent cave-ins. The prop frames must extend 1-2 m beyond the obstruction.

The tunnel passageway is made by a 6-8 man team (group). The work is organized on a shift basis with 3-4 men per shift and it is conducted as follows: 1-2 men dismantle obstructions and 2 clear away debris and set up the props. The shifts change every 20-30 minutes. The off-duty shift can make parts for the supports. The team leader is responsible for accomplishing the work and for compliance with safety measures.

The strongest people are used on the tunnel work, people with experience in similar jobs. The tunnelers' clothes and gear must be suitable for work at close quarters; they must wear helmets, and safety belts and a rope are mandatory; one end of the rope must be fastened to the belt and the other end is located outside the obstruction with the safety man. At a tunneler's signal, immediate steps are taken to extract him from the tunnel.

Pneumatic tools can be used to make tunnels--hammers, jack-hammers, winches and other machinery and tools. Team members working on the tunnel passageway are equipped with tools suitable for work at close quarters: wrecking bars, scrapers, fire axes, wood and metal hacksaws, hammers, chisels and others.

It is also possible to extract people from obstructions by dismantling the obstruction from above. This method is used when the victims are located close to the top of the obstruction or when making a passage or tunnel involves a large expenditure of time.

While dismantling the obstruction above victims, it is necessary to remember that individual elements of the pile may shift or slide and the entire pile of debris may sink when the contact between items of debris is disrupted. This is fraught with a great deal of danger for the people located under the obstruction and for those conducting rescue operations. In order to avoid this, abrupt jerks when extracting large parts, shaking and hitting them are prohibited when dismantling an obstruction. When necessary, improvised supports are set up in the form of braces with crossbars or spacers.

Vehicular lifting machinery--cranes, winches blocks and others--can be used to raise heavy debris and parts of destroyed frames if they are not connected to the rest of the obstruction. When using cranes, it is necessary to set them up away from the obstruction and to operate them with the crane arms extended to the maximum. Manual winches are set up at least one meter away from the edge of the foundation area.

In addition, victims can be extracted by making a hole in the building wall when they are located in the areas near the walls in destroyed buildings.

The job of making a hole begins with clearing obstructions away from the outside wall and, when necessary, by digging a gangway in the ground. After this, a 0.8 by 0.8 m hole is punched in the wall. Motor-driven or pneumatic tools can be used to do this job.

When there is no mechanized equipment, the hole is made by hand with a chisel (drift bore) and a sledge hammer by punching through the layers of masonry (concrete) one at a time until a large hole of the required size is made. At first, the shape of the hole is marked and outlined and then 4-6 cm deep openings 9-10 cm apart are made in the area of the hole in a checker board fashion. It is advisable to puncture the material from the bottom edge of the hole. After the first layer is removed, the following layers are punctured in the same manner until a large enough hole is made.

Depending on the nature of the damage and the location and condition of victims on the floors, people are rescued from partially destroyed and burning buildings using one of the following methods: along temporary routes (slides, swings) using improvised step ladders (rope ladders); from holes made in walls and junctions from adjoining, undamaged rooms; through entrances cleared of obstructions (especially on first floors); and using lean-to ladders, scaling ladders, rope ladders, fire ladders and other stairways and rescue ropes.

Temporary routes (slides, swings) are set up on destroyed sections of stairway landings. Ramps and planks are made from boards at least 5 cm thick; wooden blocks are attached across the ramps every 20-30 cm. If the stairway landing has been completely destroyed or if there is an obstruction at the exit to the building, people are lead out (carried out) through adjacent buildings (after holes have been punched in the walls).

People are lowered from the upper floors of destroyed and burning buildings through windows and other openings using fire, lean-to and scaling ladders; vehicle-mounted towers or cranes; or improvised gear. In extreme cases, people can be permitted to jump to safety to a tarpaulin which holds 8-10 people.

Using various devices, the men of rescue formations carry out the injured, the infirm and children.

People are rescued from burning buildings in conjunction with firefighting formations; they are equipped with mechanical ladders, special nets and panels and other rescue equipment.

When rescuing people from burning buildings, it is necessary to have wet materials (sheets, towels, blankets) to protect them; these materials are thrown over the head and uncovered parts of the body. Places which are burning openly should be negotiated quickly; smoke-filled areas are negotiated by crawling or bending over.

The medical teams immediately render first aid to victims on the spot. The medical teams work in cooperation with the rescue formations. As a rule, a detail from the rescue formations is attached to a medical detail to carry away victims. Working together, these details search out injured people and give them first aid: they stop bleeding, put bandages on injuries, make limbs immobile when bones are broken, provide artificial respiration and conduct the simplest anti-shock measures.

Victims who have been given first aid are evacuated to receive treatment from a doctor. The seriously injured are carried on stretchers, by hand and with improvised gear to transportation loading sites. The slightly injured walk to medical centers on their own or with escorts.

3. Safety Measures During Rescue Operations

When conducting operations to rescue people from obstructions, damaged and burning buildings, formation personnel must strictly observe the necessary safety measures. Commanders bear the responsibility for compliance with safety measures by their formation personnel.

Safety measures for dismantling obstructions are set forth in Chapter 9, Section 3.

Damaged buildings should be approached from the least dangerous side while attentively listening to the characteristic noise and crackling which may indicate the possibility that the damaged framework will collapse. Before advancing, it is necessary to conduct a careful inspection of the status of the building's hanging structures and, while working, it is necessary to set up observation of dangerous structures and prepare departure routes to safe areas. Damaged buildings which may collapse and structures with unstable elements must be fenced off with warning signs.

Making passages through the obstruction and work on upper floors of buildings must be accomplished using protective (safety) gear (safety belts, ropes, etc.).

When conducting rescue operations where there are fires, formations are deployed with due regard for the direction fires may spread in. When accomplishing work in the immediate vicinity of burning buildings, it is necessary to prepare departure routes in the event the burning structures collapse. In areas where there is severe smoke, protective masks (insulated or filtration masks with hopcalite cartridges) must be used.

Safety belts or ropes must be fastened on the men of rescue formations so they can be pulled out of buildings when in danger. Commanders must organize operations where there are fires so that timely steps can be taken to extinguish burning clothing or equipment parts.

When organizing rescue operations in smoke-filled buildings (when the manifold network of the gas pipeline system has been destroyed or damaged), it is primarily necessary to establish the nature and extent of the smoke and to fence off smoky areas with warning signs or posts. In addition, it is necessary to provide protection for people working in a smoky area and to take steps to prevent igniting or exploding combustible gases and mixtures of them. Only explosion-proof battery lamps fed by an electrical current no higher than 12 V should be used to light up work positions in smoke-filled buildings. When working in smoke-filled areas, protective filtration masks cannot be used; insulated or hose-type protective masks must be used. If work is being conducted on gas lines in poorly ventilated buildings, it is necessary to use non-ferrous or copper-clad tools; to avoid making sparks, chisels, winches, jacks and jack handles which are only made from steel must be greased with a lot of lubricating grease, lubricant grease or similar greases.

When working in buildings with destroyed or damaged electrical systems, electrical lines and metallic objects connected to them must not be handled with the naked hand (without rubber gloves). Before conducting any kind of work, all destroyed or damaged systems must be turned off. Only trained people under the supervision of skilled technicians can disconnect power systems.

When conducting operations in individual protective gear under high environmental temperatures, formation commanders must monitor the length of time worked since a heat stroke may result when the body is over-heated.

When working at night, it is necessary light up work areas and mark the locations of ditches in obstructions, possible cave-in areas and other areas which are dangerous to the passage of people or vehicles with conventional illuminated signs or signals.

A large amount of work must be accomplished in centers of destruction when rescuing people under obstructions or in damaged and burning buildings. To a great extent, success in rescuing people will depend upon the resue formation personnel's advance preparations, their swift, skillful work and clear-cut organization of the work by formation commanders.

In peacetime, commanders and chiefs must study and have a good knowledge of the layout of facilities and the public utility system facilities where they will have to conduct rescue operations in the event of nuclear strikes; most importantly, they must obtain the following from formation personnel: a high level of training, an in-depth understanding and intelligent accomplishment of their duties, stable morale and psychological stability. These traits must be continually improved during applied lessons and tactical-operational support exercises.

CHAPTER 9

DISMANTLING OBSTRUCTIONS, MAKING PASSAGES AND DEMOLISHING UNSTABLE STRUCTURES

1. Vehicles, Machinery and Tools Used When Dismantling Obstructions, Making Passages and Demolishing Unstable Structures

Obstructions are formed when buildings and above-ground structures on the territory of industrial facilities and of the city's residential areas are destroyed. Obstructions are random piles of large and small debris from walls, ceilings, partitions, furniture, roofs, sanitary facilities, machine tools and other technical equipment.

Depending upon the degree of density and the height of buildings in a development and the size of the nuclear burst shock wave's pressure, local or large-scale obstructions may be formed with uniform or uneven heights. Large-scale obstructions are usually formed when highrise buildings are destroyed in areas of dense development.

Various machinery, vehciles and tools are used to dismantle obstructions and make passages in them.

/Vehicles and machinery for dismantling, lifting, loading and transporting obstructions/. These include bulldozers, excavators, tractors, vehicle-mounted cranes, various trailers, manual winches, jacks, blocks and pulleys.

Bulldozers are used to dismantle obstructions, make passages and also to clear off blast shelter emergency exit caps (hatches).

Excavators are designed to dismantle obstructions, load debris on vehicles, dump trucks and trailers and to uncover underground pipelines. With slings, they can be used as cranes to move prefabricated, light-weight slabs. When operating, both the forward and reverse blades of the excavator can be used. Excavator performance specifications are shown in Appendix 10.

Tractors are used to extract various structures from obstructions and also to demolish unstable parts of destroyed buildings which are in danger of collapsing.

Vehicle-mounted cranes are used for materials handling work and to extract large, heavy debris and building structures (balconies, columns, walls, ceilings) from obstructions. Vehicle-mounted crane performance specifications are shown in Appendix 11.

/Transportable compressors with pneumatic tool kits and transportable power plants with electrical tool kits/. Pneumatic hammer drills, drills, jack hammers and concrete breakers are included in the transportable compressor systems; electric hammers, electric hammer drills and electric jack hammers are included in the transportable power plant system.

Thus, for example, the FP-55 [Frunze Plant] compressor system includes the following pneumatic tools: 3 RP-17 [expansion unknown] hammer drills, 4 OMSP [expansion unknown] drills, and a drill bit column, drill column and air hose kit. The drill hammer is used to drill holes in stone, brick and concrete walls and ceilings of obstructed blast shelters to provide air for them and to drill holes in large-scale rubble so it can subsequently be broken up using explosives. The hammer drill is used to dismantle brick work, make holes in cement walls of obstructed blast shelters and break up large pieces of debris and structural elements in obstructions. Pneumatic tool performance specifications are shown in Appendix 12.

/Metal cutting equipment/. This equipment includes kerosene and gasoline torches used to separate entangled fixtures of destroyed structures and to cut metal beams, pipes, etc.

Liquid fuel torch performance data are shown in Appendix 13.

In addition to the vehicles, machinery and tools listed, hammers, spades, pick axes, hacksaws (for metal and wood), crowbars, sledge hammers, wedges, etc., are used to dismantle obstructions and make passages.

2. Making Passages, Dismantling Obstructions, Propping-up and Demolishing Unstable Structures.

Making passages through an obstructed area is one of the most important, top-priority jobs in a center of nuclear destruction. Passages are constructed to approach the rescue details' (groups') operational areas, for passage of engineer vehicles and firefighting equipment and also for cargo and medical vehicles assigned to evacuate victims.

A passage is made through local and large-scale obstuctions up to 1 m high by clearing the passage way of debris; a bulldozer moves the debris away from the area of the passage layer by layer. With large-scale obstructions over 1 m high, a passage is made directly through the obstruction; for this purpose, the top of the obstruction is leveled off (made even) and it is packed down by tracked or wheeled engineer vehicles. The passage is made 4 m wide for one-way traffic and 7-8 m wide for two-way traffic. For a one-way passage, 15-20 m long sidings are made every 150-200 m.

Long, large structural elements (balconies, columns, ceilings) which interfere with the construction of the passage are taken out of the obstruction and removed from the passage area using vehicle-mounted cranes, manual winches or blocks. Interwoven, connected iron structures are cut with a kerosene torch (gasoline torch) or metal hacksaw; fixtures are thrown away or set aside. Large fragments of masonry which cannot be moved aside by bulldozers are broken up into smaller pieces with drills or explosives.

To uncover obstructed protective structures and underground pipelines, obstructions in a center of destruction are dismantled using excavators, bulldozers, vehicle-mounted cranes and, in some cases, by hand.

When dismantling obstructions, excavators load debris on vehicles and trailers; with straps, they are used as cranes to move prefabricated, light-weight slabs. When dismantling obstructions, vehcile-mounted cranes, kerosene torches (gasoline torches) and pneumatic tools are used for the same purposes as when making passages. When dismantling obstructions, explosive operations are only undertaken when there is complete confidence that the explosion will not cause any damage to the protective structure or to underground pipelines.

Obstructions are dismantled by hand when the work area is not accessible by vehicle or when they cannot be used. In these cases, the work is conducted by rescue teams. The teams are equipped with spades, cross-cut saws, axes, crowbars, sledge hammers, metal and wood hacksaws, hammers, chisels and kerosene torches (gasoline torches). Manual winches blocks and cranes are used to extract large, heavy structural elements from the obstructions.

A team is divided into two 3-man groups for the work. One group works in the obstruction and the other operates the manual winch (crane, block). Large slabs, fragments of walls and beams are broken up into smaller pieces; fittings and pipes

freed from concrete are cut up with the kerosene torch (gasoline torch), hacksaws or chisels. Large, separate structures are extracted piece by piece using the manual winch (crane, block). Small debris and fittings are thrown aside.

Unstable structures are propped up or demolished to ensure safety of formation personnel when rescue operations are being conducted in a center of destruction. The decision to prop up or demolish each specific structure is made after it is inspected by civil engineer specialists.

The selection of a method for propping it up depends on the height of the object being propped. Walls up to 6 m high are propped up with wooden or metal braces set at a 45-60 degree angle. As a rule, higher structures (walls, structural frames, etc.) are propped up with double braces. The use of wooden or metal braces in a particular case is determined by the presence of material to make them, the weight of the structure being supported, its slope and the strength of its contact with other parts of the building or structure. When reinforcing thick masonry walls, the braces are set up, as a rule, at each partition in the building or every 5-7 m.

When propping up unstable structures, the rescue team leader directs the team's work and observes the condition of the structure being propped up. At the slightest increase in its slope, work ceases and the team is withdrawn to a safe distance. A civil engineering specialist resolves the problem of propping it up further or demolishing it.

Structures of partially destroyed or burning buildings, such as, for example, hanging parts of roof coverings (beams, rafters, tiles, eaves) and also walls (sections of walls) with an inclination from the vertical exceeding one-third their depth, will be demolished.

Unstable structures can be demolished using cables with one end attached to the wall (structure) and the other end to a tractor, motor vehicle, winch, block, etc. The job of demolishing unstable structures is usually conducted by the rescue team reinforced with a tractor, motor vehicle, or winch (block).

The work is conducted as follows. A ladder is set up on the opposite side of the buckle (dip) in the wall; the ladder is attached to and supported by ropes on each side (two men per rope). The rescue worker climbs the ladder and attaches one end of the cable to the structure to be demolished; the other end of the cable is attached to a tractor (motor vehicle, winch After this, the ladder is taken away, people are removed to a safe distance and, at the team leader's command, the tractor

(motor vehicle) begins moving (the winch cable is stretched out) and the wall collapses. For this purpose, the length of the cable must be at least twice the height of the structure being demolished.

3. Safety Measures When Dismantling Obstructions, Making Passages, Propping Up and Demolishing Unstable Structures

When dismantling obstructions and making passages, work cannot be conducted near the walls of destroyed buildings until structures in danger of collapsing are demolished or propped up. Work is only permitted near partially destroyed buildings when continual observation of the condition of structures is provided and when withdrawal routes to a safe spot have been prepared for personnel. While dismantling an obstruction, walking and riding on top of it /are forbidden/ since individual elements of the obstruction may shift, collapse and injure the people clearing the obstruction; unstable debris lying around, especially large pieces of debris, should not be stepped on and they cannot be used as supports.

Dismantling an obstruction and making passages through it can only be undertaken after the fires in and near the obstruction are extinguished. People equipped with insulated or filtration protective masks with hopcalite cartridges are permitted to work near pockets of fire.

Before beginning work, vehicle-mounted cranes used to dismantle obstructions must be put on outriggers. While operating, it is necessary to continually monitor the crane's stability; at the slightest danger, work stops immediately. Standing under the crane's load or near taunt cables when structures are being extracted from the obstruction under the crane's power is /prohibited/.

The excavator must be set up on a flat area for operations. Before it begins operations, a warning signal must be given. Raising, turning or lowering the arms while people are located under the excavator's shovel is prohibited. Moving the excavator and changing the sweep of its arms while the shovel is full /is absolutely forbidden/.

While shoring up unstable structures, /it is forbidden/ for trucks, bulldozers and motor vehicles to pass near the work area.

Obstruction dismantling sites and passage construction sites must be lit up at night. Holes dug in obstructions, possible cave-in areas and other dangerous sectors must be marked with conventional light signals or other easily seen signs.

CHAPTER 10

COORDINATION BETWEEN GENERAL-PURPOSE CD FORMATIONS AND OTHER FORMATIONS WHILE OPERATING IN CENTERS OF DESTRUCTION

1. The Nature of Coordination and Requirements Levied on It

One of the primary missions of civil defense is conducting rescue and emergency recovery operations in centers of mass destruction.

Rescue and emergency recovery operations will be conducted under difficult conditions--large-scale destruction, severe fires, contaminated air and ground, the possibility of secondary casualty-producing effects, the danger of enemy follow-on strikes and other adverse factors caused by the enemy's employment of weapons of mass destruction. These operations may be characterized by a large number of injured, a large amount of work and limited time for conducting it. This will require using a rather large number of men and resources and implementing comprehensive organizational preparations for conducting operations.

General-purpose CD formations, support service formations (reconnaissance, engineer, firefighting, medical, emergency equipment and others) as well as CD units and elements will be used to conduct rescue and emergency recovery operations.

The successful accomplishment of rescue and emergency recovery operations within established deadlines can only be achieved by the joint efforts and coordinated actions of all the men and resources allocated to conduct these operations. Therefore, organizing and maintaining continual coordination when setting up and conducting rescue and emergency recovery operations is a very important duty of CD chiefs, their staffs and formation commanders. The nature of coordination between general-purpose formations and other CD formations being used to conduct rescue and emergency recovery operations consists of coordinating their actions by objective (mission), location

and time and of mutual assistance between them to successfully accomplish the assigned missions. Coordination is organized for formations accomplishing the primary missions.

The essence of coordination /by objective/ consists of assigning formations missions whose accomplishment will make it possible to carry out rescue and emergency recovery operations within short periods of time. For this purpose, it is necessary to have a firm knowledge of the missions and methods of accomplishing them for all cooperating CD forces. Moreover, within the entire package of operations being conducted in a center of destruction, it is advisable to single out the top priority, most important jobs upon which the accomplishment of all the operations as a whole depends.

Coordinating the efforts of CD formation personnel / by location/ when conducting rescue and emergency recovery operations consists of having the commander who is organizing these operations precisely establish an operational location (objective) for each formation. Operations on a broad front are thereby achieved and this, in turn, makes it possible to maneuver manpower and resources and to make better use of formation capabilities.

Coordinating the efforts of CD formation personnel /by time/ consists of specifically indicating a time for each formation to accomplish its mission while the mission sequence is being determined. It is necessary to bear in mind that the time factor is of exceptional importance when organizing and conducting rescue and emergency recovery operations in a center of destruction. The slightest delay in conducting operations and a lack of coordination in accomplishing missions by time can cause an increase in irrecoverable losses.

Continuity and reliability are also the primary requirements levied on coordination. Continuity in coordination is achieved by maintaining constant communications between cooperating formations and by continual supervision over mission accomplishment by subordinates and attached formations on the part of commanders and staffs, by up-dating these missions and by informing cooperating formations of them.

Reliability in coordination is achieved through the commanders' and staffs' uniform understanding and firm knowledge of objectives, missions and procedures for accomplishing them; through coordinated actions and mutual assistance among subordinate and cooperating formations during operations; by the presence of uninterrupted operational communications; and by the level of training for formation personnel in joint operations.

Previously planned, continuous and reliable coordination among formations is the guarantee of successful rescue and emergency recovery operations.

2. The Place and Role of General-Purpose Formations within the City's (Facility's) CD Force Grouping

The general-purpose civilian formations are the foundation of the city's (facility's) CD force. Moreover, facility formations are used, as a rule, to accomplish missions at their own facilities while territorial formations are used to accomplish rescue and emergency recovery operations at the most important facilities based on the city (rayon) CD chief's decision.

Based on the decision of the senior chief, facility formations can be used to carry out operations at other city (rayon) facilities.

During rescue and emergency recovery operations, the primary effort must be concentrated on facilities which are continuing their production activities in the city during wartime. The primary missions are accomplished by general-purpose formations, specifically rescue and composite detachments (details, groups).

Rescue and composite detachments (details, groups) can carry out operations to clear away obstructions and make passages in them; to demolish parts of buildings and structures; to dig out and uncover obstructed protective structures; to rescue people under obstructions and in destroyed and damaged buildings; to provide first aid to the injured and evacuate them from a center of destruction; to localize damage to public utility system facilities; and in certain cases, to extinguish and localize fires and decontaminate the premises and equipment.

Support service formations and mechanized composite detachments (details) carry out specialized operations and support the activities of rescue and composite detachments (details, groups). In this case, coordination is organized on behalf of the rescue (composite) detachment (detail, group) and the commander of this formation must organize coordination.

3. The CD Chief's (Formation Commander's) Decision is the Foundation for Organizing Coordination

Rescue and emergency recovery operations are planned in advance in peacetime based on a projection of the data. The rescue and emergency recovery operations plans indicate: the manpower and resources which will be used for operations; procedures for equipping formations with equipment and tools; time periods for

withdrawing formations to the countryside; accommodations and alerting procedures; formation distribution by facility and shift to conduct operations and procedures for moving them to centers of destruction (march routes and procedures for forming up columns, setting up reconnaissance and traffic support); setting up formation command and signal while on the move and while conducting operations in centers of destruction; and other problems connected with rescue and emergency recovery operations.

After the enemy has delivered a strike using weapons of mass destruction, the facility CD chief assesses the current situation and makes his decision to conduct rescue and emergency recovery operations. Based on this decision, missions are assigned to formations.

Upon receiving his mission from the CD chief to conduct rescue and emergency recovery operations, the formation commander refines it, evaluates the situation and makes his decision on the practical implementation of rescue and emergency recovery operations. The formation commander delivers his decision to his subordinates in the form of an order.

The facility CD chief's (general-purpose formation commander's) decision is the basis for organizing coordination between formations with different missions while they are conducting joint operations in centers of destruction.

Elements of the CD chief's (formation commander's) decision--such as concept of operations, formation missions and organization of command and signal--are primarily employed in setting up coordination between formations. In addition, the formation commander must define specific steps in coordination and deliver them to his subordinates and attached formations.

4. Coordination Between General-Purpose Formations and Other Formations

Coordination between general-purpose formations and other formations is organized directly at the operational location. In organizing coordination, the general-purpose formation commander must coordinate:

Procedures for moving his subordinates and attached formations to operational sectors (objectives) and their actions in negotiating obstructions, fires, contaminated areas and other obstacles;

Formation actions while conducting rescue and other operations in sectors (at objectives) in a center of destruction;

Procedures for evacuating the injured;

Mutual actions with adjacent units (he must understand who is operating next to him, what their mission is, what assistance he can receive from adjacent units or what assistance he can provide to them);

Procedures for using communications and transmitting information, command and control signals and warning signals and procedures for taking action based on them;

Actions in the event of an enemy follow-on nuclear strike.

While on the move and while accomplishing operations, the formation commander and staff must continually maintain coordination between subordinate and attached formations and also with adjacent units and make adjustments to coordination as necessary.

/While formations are moving to a center of destruction,/ the general purpose formation commander organizes coordination with other CD formations in the following areas:

Route status, possibility of using roadside facilities, and areas (regions) for skirting (driving around) destroyed roadside facilities;

Markings for the borders of contaiminated zones and sectors, for the direction of movement (in case of high radiation levels) and routes for skirting contaminated sectors;

The presence of injured on the march route, their estimated number, nature of injuries and procedures for providing aid;

Areas of solitary or large-scale fires, the direction they are spreading in and procedures for localizing or skirting them;

Regions (areas) of partial and large-scale obstructions and routes for skirting them;

The most advantageous sector for committing the formation to a center of destruction.

/When committing formations to rescue and emergency recovery operations objectives,/the general-purpose formation commander organizes coordination in the following areas:

With reconnaissance formations--searching out locations of obstructed protective structures and determining the best routes of approach to them;

With engineer formations--making passages (for vehicles and on foot) in obstructions or along obstructions and demolishing structures in danger of collapsing;

With medical formations--which rescue details (groups) the medical teams will work with; the location of the assembly point for the injured and march routes to it; time and location for deployment of the medical center and procedures for evacuating the injured; and medical support for rescue formation personnel;

With firefighting formations--procedures for localizing and extinguishing fires on formation committment routes to objectives and organizing firefighting at operational objectives;

With law enforcement formations--traffic control on the formation commitment route to a center of destruction and observance of safety measures while moving within a center of destruction.

/While conducting rescue and emergency recovery operations,/ the general-purpose formation commander organizes coordination in the following areas:

With reconnaissance formations--the status of people in obstructed protective structures; destroyed sites in public utility system facilities; and setting up continual, chemical observation;

With engineer formations--procedures for uncovering protective structures and dismantling obstructions in order to carry out (bring out) the injured; and the preparation of protective structures for formation personnel in the event of an enemy follow-on attack;

With medical formations--extracting victims from obstructed protective structures and providing first aid to them; carrying (bringing) victims to assembly points, evacuating them to the medical center and to the hospital center in the countryside; and medical support for rescue formation personnel;

With firefighting formations--utilization of routes by firefighting equipment; localizing and putting out fires primarily at objectives for rescue operations; protecting physical assets against destruction by fire and using firefighting equipment to rescue victims from burning and partially destroyed buildings; and supplying water for drinking and personnel decontamination;

With emergency equipment formations--temporary restoration of communications links to organize command and control of rescue operations; localizing and controlling accidents in water pipeline networks, primarily in sectors where protective structures are threatened by flooding; temporary restoration of water pipelines to extinguish fires and supply water to operational formations; disconnecting electric power lines as required in order to ensure safety while conducting operations in a center of destruction; setting up temporary electric power lines to support operations at night; and the conduct of rescue operations at electrical power supply facilities;

With radiation and chemical defense formations--collection, analysis and summary of data on the NBC situation and reporting on changes in the situation while conducting operations; deadlines and procedures for decontaminating the area, structures, equipment, personal belongings and tools; and conducting personnel decontamination for rescue formations after they are withdrawn from operational objectives;

With food service and supply formations--locations, deadlines and procedures for supplying formation personnel with hot food, water and warm clothing in the winter and, in the event of operations in a contaminated zone, a stock of clothes to change into;

With materiel supply formations--the supply of tools, materiel and spare parts for equipment; equipment recovery and repairs; and supply of POL;

With law enforcement formations--protection of physical assets while conducting operations; and traffic control on the routes for evacuating injured and when committing new formations to a center of destruction.

Upon completion of rescue and emergency recovery operations or upon receiving the prescribed exposure dose, formation personnel are withdrawn from a center of destruction. Prior to this, the formation commander coordinates his actions with the replacement formation. He brings the commander up to date on the situation and determines relief procedures with him. At the same time, he updates the following: locations of operational sectors (objectives), degree and nature of destruction at them; the radiation situation at operational objectives and the degree of area and equipment contamination; the extent of work accomplished and still to be done; procedures for using engineer equipment; operational procedures and safety measures; locations of personnel shelters in the event of an enemy follow-on attack; issues on coordination within the formation and with adjacent units; procedures for materiel support; senior chief's location and procedures for maintaining communications with him.

The commander of the formation being relieved is the senior commander during the relief.

The commanders of the relieved and relieving formations make a report to the senior chief on the handover and acceptance of sectors (objectives).

If required, the relieved formation is withdrawn to a personnel decontamination center and then to an area to rest, eat and prepare for subsequent operations.

CHAPTER 11

ORGANIZING AND CONDUCTING OPERATIONS TO CONTROL FACILITY PUBLIC UTILITY SYSTEM EMERGENCIES

1. Basic Components of Facility Public Utility Systems

The modern industrial facility has a widespread electrical, gas, heat and water supply network, sewage system and various industrial pipelines.

/The electrical power supply network/ may be a radial or a trunk network. The radial arrangement for distributing electrical power is used when the load is distributed in various directions from the center of supply. Under the trunk arrangement, electrical power is fed directly from the enterprise source of supply to shop distribution or transformer substations.

Electrical transmission lines are installed in the air (on metal, reinforced concrete or wood poles) and underground (cable lines).

/A gas supply network/ may have a central gas distribution center (to reduce the pressure of the gas to the required level) and shop distribution systems where a different pressure is required. Instead of a central distribution center, small facilities supplied from a low-pressure city network may only have gas meters.

Gas pipes are installed at a depth of 1.5-1.7 m. Shutoff valves are installed to shut off individual sections of high and medium-pressure networks; these valves are usually located at gas control substations where medium-pressure gas lines link up with high-pressure lines or where low-pressure gas lines link up with medium-pressure lines. In addition, shutoff valves are installed where pipelines branch off to industrial and other facilities and where they enter buildings and structures. Internal shop gas lines take gas from entry points to units and equipment.

/The heat supply network/ provides a supply of heat (hot water, heated air, steam) from sources to consumers. It consists of an external transfer network and an internal network.

Heat supply networks may be municipal or industrial. The municipal network is used for heating. The heat-transfer agent in it is hot water at a temperature of 150 degrees and a pressure of 6-14 technical atmospheres. In an industrial network, steam or hot air at a pressure of 25 technical atmospheres is the heat-transfer agent; they are used for industrial needs.

The heat supply network has two pipelines: the heat-transfer agent is delivered to the consumer along one of them and the condensed steam or cool water returns to the boiler works along the other.

A facility /water supply network/ consists of pipelines which supply water directly to industrial buildings and transfer points within the building which supply water to individual units and devices. Water is delivered directly from the city mains to the facility pipeline system or, if the enterprise requires a high pressure in the system, it is delivered from a pump boosting station (elevated tower) set up at the facility. As a rule, the transfer pipes for an elevated system are buried in the ground below the frostline.

For operational and maintenance convenience, manholes are installed every 50-100 m in the transfer network; regulating fixtures and fire hydrants are located in the manholes.

/The sewage system/ is designed to receive household, atmospheric (showers) and industrial waste and carry them to purification facilities. It consists of collection devices, troughs and pipelines within buildings or rain water collectors and catch basins, an outside yard or street network and collectors which carry waste water to purification facilities. The household or internal industrial sewage system is connected to the external sewage system pipes via outlets.

Three types of sewage systems are in use: common, divided and partially divided. In the common system, all waste water is carried away in a single system of pipes. The divided sewage system has two independent networks: one for carrying away domestic and industrial waste and the other for carrying rain water to the nearest reserviors without any special purification. In the partially divided system, the domestic and rain water networks are connected together by overflow systems which make it possible to transfer water from one network to the other.

Manholes are installed where pipes turn and intersect, and also where building outlets link up, in order to monitor sewage system operations and to clear obstructions in it.

/Industrial pipeline networks/ can be very diverse. Oil, gasoline, gas, acids and other liquids and gases are transported along the pipelines under pressure. The pipelines are laid underground, above ground or on special supports up to 5-m high.

2. Methods for Isolating and Controlling Emergencies in Public Utility Systems.

Emergency operations in public utility systems are primarily organized and conducted to isolate and control those emergencies which threaten people's lives, impede rescue operations or which may cause new emergencies (explosions, fires, etc.).

Work on public utility systems is accomplished by water pipeline and sewage system details, emergency equipment details, emergency gas equipment details and emergency electrical system details. Each detail consists of one, two or three associated groups. The groups contain water pipeline, sewage system and heat system specialists, electricians, sanitation technicians, gas pipeline specialists, etc. The groups (teams) are used for emergency operations in accordance with their specialties.

When isolating and controlling emergencies in public utility systems, general-purpose formations are used to carry out subsidiary operations: building earthen embankments in the path of water flowing into basement facilities, digging drainage troughs (ditches), putting out fires, dismantling obstructions and extracting victims from them and carrying out other work which does not require any special training.

During major emergencies in a facility /electrical supply system/, transformer substations, poles for electrical lines and distribution equipment may be destroyed or damaged and above-ground lines and cables may be broken or damaged.

Emergency operations are only undertaken on electrical supply systems after they are shut off and grounded. To shut them off, the electrical distribution system or individual elements of it are turned off, the cut-outs at building entry points are switched off, fuses are disconnected and sometimes lines in the delivery system are cut. Damaged electric lines are insulated, removed from the ground and hung on temporary posts. Above-ground electric lines are grounded on both sides of the work site on the nearest post; underground cables are grounded

on both sides of the destroyed cable location at the nearest transformer sites using a bridge ground.

Individual sections of damaged above-ground electrical lines are restored by connecting the lines or by laying new lines on the surviving post and on temporarily installed posts. After connecting broken lines and while laying temporary lines, uninsulated lines must be stretched at least 5 m above the ground. Damaged sections of cable lines may be connected by a temporary above-ground line or by laying a connecting cable above ground.

Destruction and damage to /gas networks/ may cause gas leaks in buildings, asphyxiation of people located in them, explosions, fires and facility premises to be filled with gas. All of this impedes and complicates rescue operations caused by emergencies.

However, explosions occur rather rarely since they are caused by a specific ratio in the air and gas mix. Thus, for example, natural gas explodes when its content in the air reaches 5.5-14.8 percent and propane explodes when its content is 2.3-9.5 percent. These proportions are usually reached when gas leaks into closed facilities.

Before beginning emergency operations on gas networks, the supply of gas to the network is stopped. For this purpose, damaged sections are cut off from gas distribution and gas tank stations using stop cocks and cut off valves on the main and valves and taps at facility entry points.

When low-pressure gas pipelines are cut or broken, the ends are plugged with wood stoppers and caulked or wrapped with sheet rubber. Cracks in pipes are welded or patched up with a coupling. Cracks can be temporarily sealed by wrapping the pipes with a thick (canvas) bandage with a sheet of rubber and a clamp over it.

/Destruction of heat supply lines/ can result in premises being flooded by hot water (filled up with steam), especially basements, and in people located near the destroyed area being burned. This danger is especially great when the pumping stations and boiler plants of the central HEPP [heat and electric power plant] continue operations and the pressure is maintained in the heat supply network.

Typical accidents on heat networks may be: breaks in pipe joints, damage to them, cracks, loss of pressurization at flange sleeves, and leaks in areas where regulating equipment and oil seal surge chambers are installed. Damage to a heat supply line is located

by the steam above the damaged section, by the indentation in the ground above the location of the break in the pipe and, in winter, by the melted snow in the damaged area.

Before beginning emergency operations on heat supply networks, the damaged sections are shut off, the hot water and steam are routed to safe areas and water is prevented from leaking into basement facilities. The heat line is permitted to cool.

To shut off the heat lines, the manholes and chambers near the HEPP or boiler plants are opened and the shut-off valves are closed. When there is damage to a heat supply system within a building, it is shut off from the outside using the shut-off valves at the building entry points.

When steel pipes are broken or when large cracks form in them, the damaged spots are welded or the pipes are replaced with new ones. Leaks in flange sleeves are eliminated by plugging the holes with wooden wedges or asbestos or by replacing the flanges.

Damage and accidents within /a water supply network/ may threaten flooding of basements being used as warehouses or for power supply and industrial equipment and, when they occur at the site of fires, they may impede putting them out or make it impossible to put them out. The danger of flooded basements and other underground facilities on the facility's premises is especially great when water pressure is maintained within the pipeline system; this is possible when pumping stations continue operating.

Damaged spots in water pipelines are detected by the streams of water flowing to the surface through nearby manholes or seeping through in places where the pipes are damaged.

To prevent the danger of basement flooding during pipeline emergencies, the damaged sections of the system are shut off by closing the shut-off valves and, when the water is gushing to the surface, earthen embankments or walls are constructed in the water's path to basement facilities or drainage gutters, ditches and by-passes are dug. Shut-off valves are closed on the pumping station side and, when the direction of movement is not known, on both sides of the damaged section. When the water supply system within a building is destroyed, the damaged building system or individual pipes are shut off by closing the shut-off valves in front of the water meter or at the pipes.

Damage to water pipes is repaired by stopping up individual leaks, reparing sockets or welded joints in pipes or by replacing damaged

pipes with new ones. After the damaged sections of the pipes have been shut off, water is pumped from flooded basements using manual or machine-driven pumps.

Damage and emergencies in a /sewage system/ leads to the same results that damage to the water supply system does. In addition, when the premises of a facility are flooded by sewage, primarily domestic sewage, for a long time, especially in the summer, conditions may be created for pockets of disease and epidemics.

Locations of damage to the sewer system are detected the same way as damage to the water system is.

Emergency operations on sewage systems boil down to draining the waste which is flowing to the surface to lower, safe areas by constructing temporary drainage canals (ditches) or by constructing by-passes to skirt the damaged sections.

The by-pass is accomplished by pumping waste along ditches (through by-pass pipes) or by letting it flow naturally through specially constructed, temporary ditches and trenches. If it is not feasible to construct natural-flow by-passes, the waste is pumped through temporary pipelines, flexible sleeves or hoses into a lower, serviceable manhole or into areas earmarked for emergency discharges. After constructing a by-pass or drainage system, the damaged section is closed off by putting a plug or stopper in the sewer pipes.

Damage to metal pipes in a sewage system is repaired just like it is in a water system. Cracks in concrete and reinforced concrete pipes are caulked and covered with cement on the outside; a piece of tarpaper or burlap and then a metal wire and a layer of cement are put on holes which go all the way through.

When there is damage to /industrial pipelines/ at enterprises, the pipelines leading to reservoirs and industrial equipment are closed off first and all the functioning pumps which maintain pressure in the pipelines are shut off in order to prevent explosions and fires. This work is accomplished under the guidance of enterprise industrial specialists.

3. Safety Measures While Conducting Emergency Operations on Public Utility Systems

Emergency operations on electrical systems are only permitted after the electric lines have been shut off and grounded on both sides of the work area. All work with electric lines and metallic objects connected to them must be conducted using protective gear (dielectric gloves, boots, overshoes, insulated

supports, etc.). Personnel without protective gear /are prohibited/ from approaching electrical lines lying on the ground or from coming into contact with electrical equipment systems.

In addition to knowing safety measures and regulations, formation personnel engaged in emergency operations on electrical supply systems must be able to give first aid to electrical shock victims.

Emergency operations on gas systems are only permitted in insulated protective masks. Tools used in these operations must be made from non-ferrous metals (copper, bronze, aluminum) or copper-plated metals which do not make any sparks during use. When steel tools are used, they must be abundantly greased down with lubricating grease, lubricant grease, petrolatum or other thick grease in order to avoid sparks. Footwear for people working in man holes and tanks must not have any steel cleats or nails; it is necessary to put rubber boots over footwear which do have them. Welding and liquid torch cutting operations /are prohibited/ in manholes, tunnels and collectors of functioning gas lines without switching them off and blowing them out with air.

Striking matches, smoking, using tools which cause sparks, using vehicles and equipment with the engines running and also devices with open flames /are prohibited/ near gas-filled facilities and on gas-filled premises. Only explosion-proof battery lights can be used to light up work areas in gas-filled sectors.

When there is damage to a heat supply system, the locations of damaged steam pipes must be fenced off with warning signs. Repair of heat lines in passage chambers is only permitted when the pipeline has been shut off on both sides and the temperature of the heat-transfer agent does not exceed 80 degrees C. Moreover, the air temperature in the chamber must not exceed 50 degrees C; at temperatures of 40-50 degrees C, work is permitted for 20 minutes with breaks of at least 20 minutes after exiting the chamber.

When conducting emergency operations on a water system it is necessary to check if the air in it is filled with gas before going down the manhole. If the gas cannot be eliminated by natural ventilation or with a fan, work is only permitted in the manhole in an insulated protective mask. Moreover, the workers must have rescue belts with a safety line.

When controlling accidents in a sewage system, it should be borne in mind that harmful, liquid fuels (gasoline, kerosene,

oil and others) may be in the sewage system; in addition, harmful, explosive gases (methane, hydrogen sulfide, carbon dioxide) form when feces decompose. Therefore, open flames cannot be used when conducting emergency operations on sewer pumping stations and it is necessary to continually monitor the air with a gas analyzer.

CHAPTER 12

FACILITIES AND PROCEDURES FOR DECONTAMINATING BUILDINGS AND EQUIPMENT. PERSONNEL DECONTAMINATION METHODS AND VETERINARY DECONTAMINATION METHODS FOR ANIMALS

When the enemy has employed weapons of mass destruction, terrain, buildings, equipment, people, livestock, produce, forage, water, etc., may be contaminated by NBC agents and substances.

To preclude or reduce the danger of people being contaminated by NBC agents and substances, the terrain, buildings, equipment and other facilities which residents may come in contact with are decontaminated; personnel decontamination and veterinary decontamination of animals are also conducted.

Under large-scale contamination, the extent of decontamination operations may be extremely large and it may not be possible to count on accomplishing the totality of this work within a short period of time. Therefore, it is advisable to conduct decontamination when it will provide a significant advantage in time when compared to the time required for natural decontamination.

This is especially true for terrain. For this reason, contaminated terrain is, as a rule, left to decontaminate naturally; decontamination using technical facilities is only conducted for small passages and isolated areas.

Personnel decontamination and veterinary decontamination of animals are continually conducted to the maximum extent.

1. Facilities and Methods for Decontaminating Buildings and Equipment

Decontamination of buildings and equipment includes gas decontamination, radiation decontamination and disinfection. Radiation decontamination means removing radioactive substances from

contaminated surfaces of buildings and equipment until the permissible standards are met; gas decontamination means decontamination of toxic agents or removing them from contaminated surfaces; and disinfection means destroying pathogenic microbes and toxins on buildings and equipment.

Buildings and equipment can be decontaminated by various methods depending on the type of contamination, the special features of the facility, the technical facilities and agents used to conduct decontamination, the season and the time available. Decontamination may be partial or complete.

/Radiation decontamination/ of buildings and equipment is conducted by two methods--mechanical and physico-chemical. The mechanical method is usually used for partial decontamination; this method is based on removing radioactive dust from the surface of contaminated facilities. The physico-chemical method is used when conducting complete decontamination and it is based on various physico-chemical processes for washing radioactive substances off of a contaminated surface with detergent solutions.

Water is the most accessible substance for conducting decontamination; however, it does a poor job washing off oily surfaces and, consequently, it does not wash off radioactive substances quickly and completely. Therefore, special substances which increase the effectiveness of the detergent process are used instead of water for decontamination. These substances include many surfactants, complexing agents, acids and alkalis.

SF-2 soap powder and OP-7 and OP-10 liquid detergents are used as surfactants.

SF-2 is an ionogenic substance; it is a sodium sulfonate mixture--a cream or dark yellow, fine-grain, uniform powder. It mixes well with water.

The decontamination solutions based on the SF-2 powder are prepared by mixing small portions of the powder in water while stirring and shaking. A 0.15 percent solution of SF-2 in water (in summer) or in ammoniawater containing 20-24 percent ammonia (in winter) are used to decontaminate equipment.

The OP-7 and OP-10 liquid detergents are non-ionogenic substances; they are complex, organic polyethelene esters. They are used as a component of the decontamination solutions designed to decontaminate building, equipment and vehicle surfaces.

The complexing agents are sodium phosphates, Trilon B, oxalic acid, citric acid, oxates and citrates.

Of the phosphates, sodium hexametaphosphate is used on a widespread basis; it is a white crystal moderately soluble in water. It is advisable to use it as an ingredient when preparing the decontamination solutions based on the OP-7 and OP-10 liquid detergents. In solution, sodium hexametaphosphate forms complex compounds with the metals included in the isotope make-up of the particles from a nuclear burst. These compounds dissolve rather well in water. Moreover, these complex compounds soften the water by dissolving the calcium and magnesium salts in it; as is well known, these salts make the water hard.

Acid solutions with sodium hexametaphosphate as an ingredient are prepared to decontaminate metals which can be treated by diluted acids.

Alkali solutions are used to decontaminate material which may be destroyed or which may corrode under the effect of acids. Winter solutions can be prepared based on these solutions by adding calcium chloride to the solution as an antifreeze (estimating 350-450 g per 1 of solution).

Decontaminating solutions can also be made from various industrial wastes. Waste containing surfactants--which are formed during metal-working at machine building, machine tool building and textile industry enterprises and which are also formed at butter-fat combines, dry cleaning plants and laundry combines. The nature of the waste is determined by the contents of fatty acids, sulfanol, OP-7 substances and various oils in them. The surfactants in waste are accompanied by alkalies, acids and alkaline metallic salts.

/Gas decontamination/ of buildings and equipment, both partial and complete, is conducted by three methods--chemical, physico-chemical and mechanical. The chemical method consists of the fact that, as the decontamination agents act on toxic agents, a chemical reaction which forms non-toxic compounds takes place. The physico-chemical method consists of removing toxic agents from contaminated facilities using solutions, steam or sorption. The mechanical method boils down to removing toxic agents on the surface of an object by cutting it off or covering it with dirt.

Decontamination agents include chemical compounds which enter into a reaction with toxic agents by forming non-toxic elements. Depending on their chemical nature and the nature of their effect on toxic agents, decontamination agents are divided into two groups--oxidizing and chlorinating--and they are used in the following solutions:

Decontamination solution No 1--a 5 percent solution of hexachoramine or a 10 percent solution of dichloramine in dichloroethane; this solution is designed to decontaminate mustard gas and binary gas toxic agents;

Decontamination solution No 2 ashch [expansion unknown]--a solution of sodium hydroxide, monoethanolamine and ammonia in water; this solution is designed to decontaminate sarin toxic agents;

Paste and suspensions of bleaching powder or the two-thirds basic salt of calcium hypochlorite in water; they are used to decontaminate rough metal, rubber and wooden articles.

Contaminated objects are /disinfected/ using two methods--chemical and physical. The chemical method is based on the use of disinfecting solutions which have the ability to destroy pathogenic microbes and toxins. The physical method consists of destroying pathogenic microbes at high temperatures.

Decontamination solution No 1, paste and suspensions of bleaching powder or the two-thirds basic salt of sodium hypochlorite in water and also special substances--Formaline, carbolic acid and Lysol--may be used to disinfect buildings and equipment.

Formaline, for example, is a solution of water and formaldehyde--a colorless gas with a pungent odor which dissolves well in water. To disinfect equipment contaminated by sporogenic microbes, it is diluted in a 1:1 ratio with water; then, 100 g of monochloramine is added to each liter of the diluted Formaline. To obtain a solution to disinfect equipment contaminated by non-sporogenic microbes, 1 part Formaline is mixed with 9 parts water.

In addition, various types of organic solvents can be used to decontaminate equipment; these solvents do not destroy or combine with NBC agents and substances; they only facilitate their removal from (washing them off of) contaminated surfaces more quickly and completely. At the same time, the solvents themselves become contaminated and dangerous to people.

Special vehicles and equipment, farm and construction vehicles and other technical equipment are used to decontaminate buildings and equipment. Many vehicles and devices can be used for this purpose without any additional modifications but some of them require significant modifications which can easily be made in enterprise, sovkhoz and kolkhoz garages and repair shops.

The TTS [tank-truck sprayer] is the most suitable for decontaminating buildings and equipment. Elements of CD military units

are equipped with them. This vehicle can decontaminate, for example, 30 cargo trucks or 25 tractors with one load (2,500 l).

The following municipal services equipment is used for decontamination: street sprinklers, sanitation vehicles, fuel tank trucks, water and oil tank trucks. However, all of this equipment must be modified with flexible, roll-out hoses with nozzles.

The following farm equipment can be used: the FTS-1 (fan-driven tractor sprayer), the FGS (fan-driven garden sprayer), the TS-B and TS-48 (tractor-mounted sprayers).

There are special systems for decontaminating tractor equipment: the IDS-1 [individual decontamination system] and the DS-4 [vehicle-mounted decontamination system].

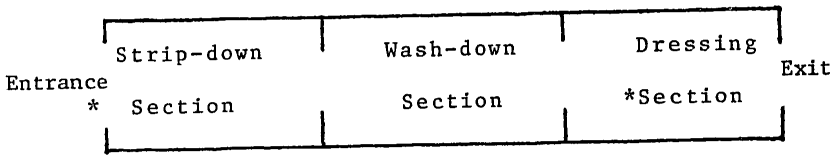
2. Personnel Decontamination

It is customary to call the measures for removing radioactive substances, toxic agents, pathogenic microbes and toxins which have fallen on an individual's skin and the mucous membranes of the eyes, nose and throat, personnel decontamination. Personnel decontamination is conducted to prevent or to minimize casualties among people primarily when the level of contamination on the body's surface exceeds permissible standards. It should also be conducted when it is not possible to specifically monitor the level of contamination during operations and people and their clothing have been contaminated as a result of their exposure in a center of contamination or as a result of using contaminated gear and articles.

Depending on conditions, the nature of contamination and the availability of appropriate equipment, personnel decontamination is partial or complete. Partial or preliminary decontamination (prior to more thorough, complete personnel decontamination) is conducted immediately after people leave a contaminated area. Complete decontamination is conducted at fixed washing centers, baths, shower stalls, sanitary disinfection centers or at special personnel decontamination centers (SPDC) using the mobile DSU-53 [truck mounted disinfection-shower unit] and the DSS [trailer-mounted disinfection-shower system] facilities.

Before entering the strip-down section of the personnel decontamination site (see diagram), people remove skin protective gear in an area specially earmarked for this purpose. In the strip-down section, they remove their outer clothing and footwear and then their protective masks and underwear. Protective masks are not removed in the strip-down section if there is

contamination by highly toxic agents; they are removed in the wash-down section. Clothing and footwear are turned in for decontamination. Documents and valuable articles are turned in for storage in the strip-down section. After this, people proceed to the wash-down section.



*Dosimeter operator monitors radiation

Personnel Decontamination Site Diagram

When people are contaminated by radioactive substances, the dosimeter operators located at the personnel decontamination site determine the level of contamination before they enter the strip-down section and after they exit from the wash-down section. When people are contaminated by biological agents, their clothing is sprayed with a 0.5 percent solution of dichloramine B before they enter the strip-down section. When conducting personnel decontamination (wash-down), 30 g of soap and 30-35 l of water heated to 38-40 degrees C are used per person.

In the dressing section, people who have gone through personnel decontamination receive clean underwear, clothing and footwear (their own decontaminated articles or articles from the clothing-change stock) as well as the documents and valuable articles they turned in at the strip-down section.

3. Veterinary Decontamination of Animals

Veterinary decontamination of animals is set up when it is definitely established that they are contaminated. When they are contaminated by radioactive substances, selective dosimetric monitoring is conducted first and, when contamination higher than standards is detected, they are decontaminated.

A special site for veterinary decontamination of animals is set up in an uncontaminated area or in an area with permissible levels of radiation (when the area is contaminated by radiation). The size of the site is determined by the number of animals being decontaminated at the same time based on an estimate of approximately 30 m^2 per animal. The site must be planned so that at

least 5-6 cattle can be decontaminated in it at the same time. The site is divided into "dirty" and "clean" sections.

Veterinary decontamination of animals contaminated by radioactive substances can be conducted using the dry method. This type of decontamination is conducted using veterinary disinfection vehicles and vacuum cleaners. The best method of dry decontamination for sheep is shearing them.

When the wet method is used, animals contaminated by radioactive substances are decontaminated with solutions of water and detergents or they are washed down with water under a pressure of 2-3 technical atmospheres using various vehicles. A 0.3 percent solution of SF-2 powder or a 3 percent solution of OP-7 (OP-10) liquid detergents with a 0.7 percent solution of sodium hexametaphosphate added are used as detergents. When these substances are not available, solutions of Novost' soap powders or sulfanol, normal soap or the standard PO-1 foaming agent can be used. When animals are contaminated by toxic or biological agents, the appropriate gas decontamination solutions or disinfecting agents are used to decontaminate them.

Cattle being decontaminated are driven into the corral and from there they are sent to the stalls for decontamination in groups of 5-6. In the stall, each animal is decontaminated on both sides with the appropriate substance (solution) using shower brushes.

Livestock farms, livestock premises and feed are also decontaminated.

4. Organizing Decontamination and Personnel Decontamination

The accomplishment of decontamination and personnel decontamination measures is an extremely complicated mission; it can only be successfully accomplished by making organized use of the manpower and technical equipment which have been prepared in advance.

City, urban and rural CD chiefs--and at national economic facilities, facility CD chiefs--organize all decontamination and personnel decontamination measures.

The following formations are established to conduct decontamination and personnel decontamination operations: composite radiation and chemical defense detachments (details, groups), decontamination details (groups), medical wash-down centers (MWC), equipment decontamination stations (EDS) and clothing decontamination stations (CDS). The MWC, EDS and CDS are

established using facilities of national economic facilities municipal services, domestic services, motor vehicle transportation and others.

Firefighting and engineer support service formations are also used to accomplish decontamination missions. Chemcial defense detachments are established at oil refineries and chemical enterprises with large industrial stockpiles of strong toxic agents.

Let's examine two examples for organizing decontamination and personnel decontamination.

Example 1. /An order to conduct decontamination operations/. The enemy delivered a nuclear strike against city A at 0600 on 15 September. An industrial facility was in the zone of severe destruction. Protective structures are obstructed; a hazardous fire situation has arisen and radiation levels at 0800 on 15 September were 25-30 R/hr. Ammonia is evaporating from a five-ton ammonia tank; ammonia vapors are spreading throughout the facility.

At 0800 on 15 September, a resue detachment, two medical teams, a firefighting detail, an emergency equipment detail and a decontamination detail arrived at the facility.

The facility CD chief of staff (the radiation and chemical defense service chief) assigned this mission to the decontamination detail leader:

"Bring the secondary center of chemical contamination under control by diluting the concentrated ammonia with water to a safe concentration so rescue and emergency recovery operations can be successfully conducted. Begin operations at 0815; complete operations at 0945 on 15 September.

"Personnel will work in individual protective gear. Permissible exposure dose is 20R. Monitor exposure using the group method; issue individual dosimeters to group and team leaders.

"Proceed to the assembly point at the facility's south gates upon completing operations; conduct partial special decontamination and personnel decontamination there.

"Report on operations at 0845 and 0915.

"I am at the facility CP."

Upon receiving his mission, the decontamination detail leader refines it, assesses the situation, estimates his resources and

time for the operations and issues an oral order to group and team leaders:

"Group No 1--decontaminate the route from the plant administration to the facility's south gates using two street sprinklers and one water tank truck; Group No 2--decontaminate the site for loading injured on vehicles near Shop No 10. Conduct decontamination by washing away radioactive fallout with water.

"Group No 3--bring the center of contamination formed by the ammonia under control by diluting it with water (20 t of water per t of ammonia) using two motor-driven pumps and three water tank trucks.

"Support Group--set up a vehicle loading point by Fire Hydrant No 3 and prepare solutions.

"Reconnaissance Team--continually monitor changes in the radiation and chemical situation in operational sectors.

"Dosimetric Monitoring Team Leader--establish thorough monitoring of the total decontamination effort and of personnel exposure.

"Everybody will work in individual protective gear; Group No 3 will work in insulated protective masks.

"The permissible exposure dose for the day is no more than 20 R. Monitor exposure by the group method; issue dosimeters to group and team leaders.

"If necessary, use the blast shelters in shops No 2 and 4 to shelter personnel.

"The assembly point upon completing operations is the facility's south gates.

"I am with Group No 3; my deputy is the leader of Group No 2."

Example 2. /Calculating personnel decontamination capabilities of a special personnel decontamination center (SPDC)/. It is necessary to conduct personnel decontamination of first-shift formations which completed rescue and emergency recovery operations at the facility at 1300. Weather conditions: temperature +17 degrees C, wind speed 2-3 m/s. Begin decontamination at 1330 on 15 September. There are two DSU-53 vehicles and two DSS units at the SPDC.

Personnel decontamination capabilities in the summer are: one DSU-53--96 people per hour; one DSS--48 people per hour.

Personnel from the first shift formations include: rescue detachment--220 men; two medical teams--48 men; firefighting detail--25 men; emergency equipment detail--45 men; decontamination detail--50 men; total--388 men.

SPDC capabilities:

$$(96 + 48)\ 2 = 288 \text{ men per hour.}$$

The time required for personnel decontamination of the entire complement is:

$$388 \div 288 \approx 1.35 \text{ hr or } 1 \text{ hr } 20 \text{ min.}$$

Personnel decontamination will be completed at 1450 on 15 September.

Upon completing personnel decontamination, SPDC personnel will decontaminate their vehicles, premises, equipment and the ground around the SPDC.

When conducting decontamination at personnel decontamination centers, it is necessary to take steps to protect workers against NBC agents and substances and against the harmful effects of decontamination equipment and agents. All operations are conducted using individual protective gear; in addition, when radiation decontamination is being conducted, monitoring of personnel radiation exposure is set up.

When working in insulated protective clothing, it is necessary to observe the prescribed maximum times for people to remain in it; in the winter, steps must be taken to prevent cases of freezing.

When conducting decontamination, /it is forbidden to/: lie or sit on contaminated articles or ground; place decontamination gear on them; remove or unbutton individual protective gear; eat, smoke or rest at work sites. Rags and other materials used during operations must be buried in the ground in an area specially earmarked for this purpose.

Upon completing operations, all equipment used to conduct decontamination operations will be taken to an uncontaminated area, inspected, cleaned of remaining substances and solutions and monitored to determine the level of residual contamination.

CHAPTER 13

METHODS AND ORGANIZATION FOR FIGHTING LARGE-SCALE FIRES AND FOR DISASTER CONTROL

Civil defense forces, specifically civilian formations, do not just train for rescue and emergency recovery operations in centers of destruction (contamination) in wartime, they may also be used to fight large-scale fires and for disaster control efforts in peacetime.

1. Large-Scale Firefighting Methods and Organization

Fire is a disaster which manifests itself in the destructive effect of fire which has gone beyond human control. Fires are caused by natural forces of nature or by industrial accidents but they are usually caused by people handling fire carelessly. In wartime, large-scale fires are also possible as a result of the enemy's employment of nuclear weapons and incendiary agents.

Fires cause enormous damage. A knowledge of the basic methods, tactics and practical skills for putting out fires is one of the most important missions of CD civilian formations.

Firefighting begins by organizing fire reconnaissance. Reconnaissance enroute to the fire and in the area of the fire obtains precise information on: the nature of the fire and the direction it is spreading in; possible areas for setting up defensive belts to localize the fire; the availability and status of water sources; and routes for removing people located in the fire zone and methods of rescuing them. In addition, during reconnaissance of forest fires, detailed information is obtained on locations of natural and possible artificial firefighting belts, locations of peat bogs and coniferous undergrowth.

A survey of sources of water and possibilities of using them is of special importance. When there are fires in populated areas, fire hydrants and special fire reservoirs are checked first.

When there are none or when they are out of commission, the nearest artificial sources of water (sedimentation tanks, water-cooling systems and wells) are inspected. In all other cases, natural sources of water are found and the feasibility of using them is studied (their status, maximum discharge, methods for taking on water, approach routes, etc.).

An assessment of the fire situation is made based on the reconnaissance data. The assessment includes: determining the nature of the fire (where, how, what is burning and what are the trends in the spread of the fire) and its possible duration (how much time will be required to localize and control the fire); an estimate of the availability and demand for water; an update on the capabilities of one's own manpower and resources and the requirement to call on additional manpower and resources to put out the fire.

Then, based on the assessment of the fire situation, a decision is made for employing manpower and resources to put out the fire. The decision is delivered to subordinates as an oral order (instructions) which provide: brief information on the situation; formation missions--the decisive operational sector and the most efficient methods and procedures for putting the fire out; operational areas (their borders); the manpower and resources allocated to the areas and objectives where the primary effort should be concentrated; evacuation routes and methods for rescuing people; time to begin and complete operations; actions during CD alert signals; aid station locations; CP locations; procedures for maintaining communications and deadlines for submitting reports.

After refining the missions, formation commanders organize to localize and put out the fires. Elements are assigned operational areas for extinguishing the fire and the necessary equipment is allocated. In turn, element leaders--chiefs of operational areas--define missions for their subordinates and indicate their operational areas.

When there are fires in /populated areas/, localizing the fire means not permitting it to spread to adjacent buildings and structures. Such fires are primarily fought two ways--by actively and passively localizing the fires.

Actively localizing the fire consists of making widespread use of the following four methods of firefighting and various combinations of them:

Using fire extinguishing agents (water, liquids, foam, carbon dioxide) on the surface of burning material;

Creating an inert environment (steam, carbon dioxide, nitrogen, finely sprayed water) in burning areas;

Using agents which inhibit a combustible reaction (ethyl bromide, ethylene, halogenated hydrocarbons,* and others);

Forming an insulating layer of fire extinguishing agents (dry powders, chemical foam and air driven foam) between the combustible area and the combustible materials or the air.

Active fire localization is used when the fire situation is favorable, sufficient quantities of manpower and resources are available, abundant sources of water are available and the area of the fire is small.

Operations to extinguish the fire are undertaken immediately using fire engines, motor-driven pumps, pumps and sprinkler systems. The fire engines are arranged so it will be possible to extinguish fire in different buildings and to maneuver the hoses. Fire lines are laid along the shortest route to the most intensely burning areas.

The spread of the fire is restricted and it is brought under control by: the rapidity with which the hosemen take up their positions and by their skillful actions; an uninterrupted supply of fire extinguishing agents; continual coordination among elements and hose maneuverability; opening structures and creating fire breaks.

Primary efforts are basically concentrated on rescuing people. The methods for rescuing people are: carrying away victims; bringing victims down fire escapes and transportable ladders; people being rescued exiting the area on their own; and leading evacuees away under the supervision of firemen. At first, people who threatened by the fire are rescued and then the injured are evacuated; they are carried out over intact staircases and through windows using extendable ladders, rope ladders, ropes and other rescue equipment.

After people are rescued, operations are undertaken to extinguish fires in the decisive sector. First, attempts are made to eliminate any danger to people and to preclude explosions and industrial accidents. Powerful streams of fire extinguishing agents are directed at those sections of structures which may cause part or all of the building to collapse if they catch on fire or if there is a change in their stability.

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*Halogenated hydrocarbons include Freon 114 V2, 13 V1 and 12 V1.

A reduction in the intensity of the fire and localization of individual pockets of fire are achieved by skillfully selecting the most efficient firefighting equipment and methods. When the blazing fire is put out, steps are taken to air out the premises. Opening doors and windows makes it possible to discover hidden fires.

Passive localization of a fire--blocking routes where the fire may spread--is employed when there is a limited number of firefighting equipment and resources, a large area of fire, insufficient sources of water and a danger that individual fires may grow into a large-scale fire. At the same time, provisions are made for partial utilization of fire extinguishing agents on adjacent buildings which are not burning and for widespread employment of fire breaks or fire belts.

The implementation of this type of localization is facilitated when populated areas have broad streets and avenues, undeveloped areas, water barriers and other barriers. Fire breaks are set up when the streets are narrow, there is high-denisty development and there are insufficient sources of water. These breaks are constructed up to 50 m wide by knocking down buildings and removing highly inflammable materials.

Bulldozers, tractors with attachments, graders and other equipment are used to strip fire belts. Lift equipment, cranes, hoists, block and tackle--are used to the maximum possible extent in removing and dismantling structures. If necessary, isolated groups of buildings are intentionally demolished to save the rest from the fire.

When fires break out at facilities which process highly inflammable liquids and combustible materials, pipelines and emergency sections are closed off. To prevent explosions and fires in containers (tanks, gas tanks) filled with combustible liquids and gases, they are cooled off and mounds are built around them. When there are flammable petroleum spills on the surface, they are extinguished with foam. Fires are localized at storage areas for liquid gasses by shutting off incoming pipelines and then cooling off the containers with powerful streams of water.

/Large-scale forest fires/ are especially dangerous. The large expanse of forests, their high degree of vulnerability to fire, the large amount of combustible materials, the decomposition of gases in forests and a number of other condition lead to a situation where a forest fire is quickly transformed into a destructive disaster.

By type, forest fires are divided into low-level, high-level and ground-level fires; by intensity of fire, they are divided into

low, average and high; by the nature of combustion, they are divided into steady and rapid. Various firefighting methods and procedures are used depending on the nature of the forest fire and the nature of the factors influencing its spread (the combustible capacity,* the dampness of combustible materials, terrain and, most important, the wind).

In all cases, it is hard to fight forest fires. The difficulty primarily consists of the limited road system leading to the pocket of fire, insufficient sources of water and also the fact that formation personnel will have to function under smoky conditions, limited visibility and air contaminated by carbon monoxide.

It is somewhat easier to fight low-level forest fires which primarily spread through the underbrush.

During a low-intensity, low-level fire, the fire primarily spreads along the forest bed; its rate of advance is 0.25-0.4 m/min.; the height of the flames is approximately 30 cm; the surface temperature of the ground is approximately 500 degrees C. White or light gray smoke accompanies the fire.

The primary methods for putting out low-intensity, low-level fires are: beating the edges of the fire with materials at hand, covering the fire with dirt or pouring water over it and digging a deep trench around it.

The method of beating the edges of the fire consists of beating back the flames with branches of deciduous trees, brooms, spades and other materials at hand.

Fighting a fire by covering it with dirt consists of beating back the fire by smothering it. This method is effective where the dirt is thin and it is easy to dig ditches to collect dirt, (sand, podzol) but it is difficult to use where there is a thick forest bed which may have decomposed matter underground and it is difficult to use in rocky or clay soil.

When sources of water are available, low-level fires are extinguished by fine streams of water; burning stumps, dead wood and brushwood are extinguished with compact streams.

Digging deep trenches (15-50-cm deep) makes it possible to set up a fire barrier in the path of the fire. However, with this method, it is necessary to watch that sparks and fire brands do not cross to the opposite side of the ditch.

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*Combustible capacity is the amount of combustible material per unit of the burning area; it is usually measured in kg/cm^2.

Average, low-level fires are characterized by intense burning: the fire spreads at a rate of 6 m/min.; the height of the flames are 0.6-1.5 m; the depth of the edge reaches 2 mm; the ground surface temperature is approximately 600 degrees; the smoke is light gray and, over the front of the fire, it is black.

Average, low-level fires are localized by setting up barrier zones and by using water and chemical agents.

The method of setting up barrier zones consists of constructing 0.5-4 m wide zones free of combustible materials in front of and to the sides of the fire. The zones are set up at a distance of 20-100 m in front of the fire and 10-40 m from the sides of the fire. If there is enough time, the zones can be expanded to 25-50 m in front of the fire and to 8-10 m on the sides of the fire using road building equipment and graders.

Spraying compact streams of water does a good job of localizing low-level forest fires. Adding wetting agents (OP-7, sulfanol, sulfanate and others) to the water increases its fire extinguishing efficiency by a factor of 2.5-3.

High-intensity, low-level fires are characterized by a very high combustion intensity; they may advance at a rate of 16-17 m/min.; the height of their flames is 2.4 m; sources of water may have to be 10-15 m away. They are localized by setting up barrier zones using earth digging equipment and by setting a backfire.

The essence of setting a backfire consists of setting a fire in the path of the oncoming low-level fire. The fire is usually set at fire lanes. Natural firefighting boundaries (clearings, roads, rivers) are selected as fire lanes; if there are not enough natural boundaries, they are artifically made using road building equipment, explosions or by hand. A fire lane must be 5-10 m wide. When setting a backfire, it is important that the impact fire travel a distance equal to 3 times the height of the fire's flames.

An encirclement tactic is used to put out low-level fires; when there are not enough people, a narrow encirclement from the front or rear is used. It should be borne in mind that low-level fires can be localized from the front if the wind speed is less than 3 m/s; at greater wind speeds, they are localized with a narrow encirclement from the sides using a backfire.

At a wind speed of 6 m/s, low-level fires usually develop into high-level fires. High-level forest fires burn mature trees, underbrush, seedlings and ground cover. These fires may be

steady or rapid. When there is a tightly packed forest cover, the fire will be stable; when there is an increase in the dispersal of the bed and in wind speed, it causes the fire to change into a rapid one; moreover, the fire spreads along the forest cover as individual tongues of flame.

Low-intenisty, high-level fires are characterized by tree-top and underbrush fires. During such fires, the fire advances as a wall several meters high; ground surface temperature is 800-850 degrees C; the rate of the fire's advance is approximately 30 m/min. The fire is accompanied by black smoke and a convection column rises above it to a height of 600-1000 m.

This type of fire is extinguished by water; the most effective way to deliver water is in compact streams from top to bottom. Aircraft and helicopters have been actively used recently to extinguish these fires.

Average and high-intensity, high-level fires are the most dangerous types of forest fires. The fire's rate of advance reaches 130 m/min. and for rapid, high-level fires, it reaches 400 m/min.; the wall of fire rises 25 m and higher and the burning temperature rises to 1200 degrees C. A convection column, which sometimes takes the form of a mushroom, forms above the fire up to a height of 2000 m. Sparks and burning particles are tossed to 500 m and higher.

Setting a backfire is the primary method for putting out these fires. Moreover, the backfire must extend at least 100 m in front of the fire and at least 50 m in front of the fire's flanks. When using a backfire, it is necessary to remember that, against the front of a high-level fire, the backfire spreads 5-10 times slower than the fire itself and it will take 1-2 hours to burn a strip 100-200 m wide.

The following tactics can be used to speed up the backfire: a "crest," burning with an advance fire and spot burning. These tactics speed up burning by a factor of 1.5-2.

When putting out forest fires, a backfire can be set at any time of the day but it is more advisable to do it between 2200 hours and 0700 hours in the morning when the wind has died down, dew has fallen and the intensity of the fire has declined. This is the most convenient time for a backfire during high-level fires. Fighting high-level fires is difficult and dangerous during the day when winds blow at speeds of 6-10 m/s and they are constantly changing direction; at night, the gusts of wind are weaker, the nature of the fire is more definite, the width of its front is sharply reduced, i.e., favorable conditions are created for setting a backfire.

Ground-level forest fires frequently do not burn on the surface; they are detected by smoke escaping from the ground and by withered grass and tree leaves. Their rate of development is not high--100-150 m per day.

There are two types of ground-level fires: surface and subsurface (deep) fires. The subsurface fires are especially dangerous; fighting them is complicated by the fact that the area where they are located is severely filled with drifting smoke and hollow cavities--burned out areas dangerous to people and equipment--form under the top of the soil.

Surface, ground-level fires are caused by hidden pockets of fire in the aftermath of a low-level or high-level forest fire. They spread along the forest bed or humus of the soil; their rate of spread is not dependent upon the cyclic nature of the wind or the time of day and the rate is approximately 0.1 m/hr. Digging deep ditches is the primary method for localizing these fires.

During an above-ground peat fire, the upper layer of peat, peat dust, the remains of wood and piles of peat burn. The fire moves in the direction of the wind; its rate of movement depends upon wind strength and wetness of the peat. The fire spreads especially quickly in areas where peat is mined by cutting: the fine peat dust rises into the air like a rotating column of peat and it carries burning particles and sparks with it; the latter form new pockets of fire.

The primary method of fighting surface fires is putting them out with water. Other methods include setting up barrier zones (when the beds are not very thick), wetting down the peat, spreading wet material over the pockets of fire and digging trenches around them.

If the fire is extinguished with water, it is necessary to set up a strip (curtain) of water along the entire width of the fire's front. With a slight wind, the hosemen's initial positions are selected 30-50 m from the edge of the fire and with a strong wind, they are 100-150 m away. The ^{B} nozzle provides coverage for a 10-15 m wide area and the A nozzle covers a 20-30 m wide area.

Burning piles of peat lumps are extinguished with powerful streams of water and burning piles of cut peat are extinguished with diffuse streams while simultaneously removing (scraping away) the burned layer of peat. With layers of peat up to 30 cm thick, 4-5 m wide dirt barrier strips are made. In two passes, graders and bulldozers usually remove the peat to the ground's mineral layer.

Peat is wetted down using fire engines, motor-driven pumps, railcars and rotary tractor pumps.

When there is a subsurface (deep) fire, the peat burns right down to the water table or to the mineral layer of the ground. Moreover, black burned-out spots open up in isolated places. Gusts of wind and 15-20 degree changes in it may change the shape of the fire and sharply increase its front.

The primary methods for localizing subsurface fires are digging ditches, trenches and holes around the area of the fires and extinguishing the fires with water.

Ditches (trenches) 1 m wide across the top and 30 cm deep are dug using plows (ditch diggers and trenching vehicles) and by hand. Holes are made in peat beds over 1.5 m thick using excavators and ditch digging equipment and also by explosions.

The pockets of fire are covered with water using forest fire formation equipment and peat enterprise equipment. When there are not enough good sources of water, the ditches between banks and crevices in peat diggings, which are usually filled with surface water, are used. Small pockets of fire may be covered with wet batches of peat.

The primary tactic for localizing ground-level fires, especially peat fires, is encircling them. Then, attempts are made to break the pocket of fire up into parts and extinguish it piecemeal.

When extinguishing forest fires, primary efforts are directed at the decisive sector; this sector is selected based on the requirement to rescue people and to protect populated areas, as well as the presence of equipment and other physical assets in the woods. Coordination of all manpower and resources being used to extinguish the fire is organized in the decisive sector.

The firefighting supervisor has the responsibility of organizing firefighting, using equipment and commanding formations which have arrived in the area of the fire. For normal forest fires, one of the forest fire formation commanders, who has a good knowledge of the forest fire area and experience in fighting different kinds of fires, is assigned as the supervisor. He or his assistant meets the CD formations and assigns them their missions. The firefighting supervisor provides the necessary assistance to all arriving formations and briefs them on fire-fighting tactics.

During major, large-scale fires, the firefighting supervisor is either responsible to the firefighting staff or to an emergency commission; he keeps them informed of the firefighting status, the need for bringing in additional manpower and resources and other issues. The firefighting supervisor pays special attention to precise and efficient accomplishment of the operations.

The following are important during any forest fire: a quick arrival at the fire, skillful monitoring of the fire, well-organized reconnaissance, a clear-cut tactical deployment, immediate actions to rescue people and physical assets and immediate action on aggressive firefighting. Moreover, the result of firefighting efforts is frequently determined by a correct assessment of the situation, by effective decisions (firefighting plans) and by purposeful leadership.

Regardless of how complete reconnaissance data are, each formation commander must be able to assess the situation in his own sector on his own: single out the decisive sector and take into account the peculiarities of local conditions and the performance characteristics of his elements.

Success in fighting a fire also depends upon a knowledge of equipment safety rules during a fire and on observing these rules during operations. One of the primary requirements of these rules is supplying personnel with coveralls, helmets and smoke masks. It is required that all people participating in firefighting efforts have protective masks (insulated or filtration masks with hopcalite cartridges).

Operations in smoke or gas filled buildings must be conducted in 2-3 men groups. Personnel working in dangerous areas must have rescue belts with a safety rope.

In the immediate vicinity of the fire's edge, operations are permitted in heat reflecting suits, coveralls and under the protection of streams of water. Personnel must not be in the immediate vicinity of the fire for more than 30 minutes; afterwards, they must be given a 20-30 minute break outside the smoke and heat radiation zone.

Fire equipment parking places and firefighting positions should be selected at a distance which ensures that people and equipment will be protected against damage by the fire and from collapsing, burning structures and parts of buildings and structures. To protect operational personnel and equipment from the fire, changes in the fire's development and the status of supporting structures are monitored.

When fighting forest fires, special attention is directed at controlling the danger to people and at providing evacuation routes. Passages are made over marshes and burned-out areas to safely remove victims from the area of the fire. In sectors where the fire is most intense, fire posts are set up with equipment to extinguish burning clothing on people. While putting out forest fires, and especially peat fires, it is necessary to maintain a reserve of recovery vehicles to bring broken down equipment and their crews out of the fire zone. Using equipment with malfunctioning engines and refueling engines near the fire /are forbidden./ Movement /is prohibited/ in an area of subsurface fires.

It is mandatory that medical personnel with the required medical kits be located in the formations conducting fire-fighting operations. Aid must be rendered in a timely manner for burns or wounds; when there are dangerous burns, significant damage to the skin, asphyxiation or shock, victims are immediately sent to the hospital.

It is the duty of each chief at a fire to be concerned about protecting his personnel against overheating and against the harmful effects of smoke and carbon monoxide. At the same time, nobody participating in firefighting operations has the right to arbitrarily abandon his place at the fire.

2. Methods and Organization for Rescuing People and Industrial Equipment During Floods

The primary causes of disastrous floods are: rapid melting of snow and glaciers; unexpected downpours, steady rains, hail and other phenomena connected with abundant precipitation; the formation of ice jams and obstructions in rivers and an accumulation of slush in river beds; the wind driving water into the mouth of rivers and bays; and the effect of disastrous waves (seismic sea waves) on the coast.

One of the most effective ways of combatting disastrous floods is to eliminate the causes of floods (for example, building dams which regulate the flow of precipitation and limit the possibility of disastrous floods). At the same time, the construction of hydrotechnical structures (dykes, dams, artificial reservoirs) gives rise to another cause of floods--the breach of hydrotechnical structures when they are damaged or destroyed.

In cities, rayons and facilities which are located in disastrous flood zones, a number of provisions are made by local authorities, the facility management and CD staff, specifically: setting up a reliable communications system between CD staffs, shipping

companies, hydrometeorological services and other organizations; developing an evacuation plan for residents and livestock; preparing facilities to receive and accommodate evacuees; setting up stockpiles of food and medicine; establishing procedures for using water crossing equipment; setting up storehouses for stones, logs, rails and other materials; and establishing evacuation procedures for organizations and physical assets.

Hydrological posts are put on increased alert to provide timely warning on the danger of a flood and additional observation posts are established by CD formations. Direct communications are established between command posts and these posts.

A warning is given when there is immediate danger of a flood. The Flood Danger warning signal is sounded when a flood is inevitable. At this signal, arrangements are made to evacuate residents, transport physical assets and drive livestock to non-flood areas; water crossing equipment arrives at docks and piers; and CD formations are sent to the flood area.

During the flood, air reconnaissance is organized immediately and reconnaissance patrols are sent out by CD formations (in cutters, motorboats and other water crossing equipment). All types of reconnaissance obtain precise information on the size of the flood, the most advantageous routes for evacuating people, livestock and various physical assets and the most advantageous routes for getting formations to their objectives for rescue operations.

An assessment of the situation in the flood area is made based on the reconnaissance data; at this time, the following is determined: the level the water has risen and the flood borders; where, how and what may be flooded; the trend in the flood's development; status of evacuation routes; equipment required to conduct rescue operations. Then, missions are assigned to formations based on the CD chief's order (instructions).

Cutters, barges, rafts, ferries, boats, ships, military assault crossing craft and helicopters are used to remove people from the flooded area. Upon receiving water crossing equipment, formation commanders must be sure they are in good working order and have life-saving gear on board.

Patients, women and children are rescued first. Ladders, ropes and other material at hand are used to remove people from the upper floors of buildings, trees and other high places and to load them on water crossing equipment. Water crossing equipment

with good equilibrium (the ability to maintain its balance and not tip over) is primarily used when conducting rescue operations.

Life preservers, inflatable vests, life belts and cork floats are thrown out to help people in the water. Then, using ropes and poles, they are brought on board the water crossing equipment and taken to shore.

Helicopters remove people from ice floes in whirlpools or rapids.

First aid is given to people who are rescued from the water's surface and taken from the water or from the bottom of reservoirs. This first aid consists of calming them, drying them, dressing them in dry clothes, wrapping them in blankets and giving them a sedative to drink. First aid given to people taken out of the water or from the bottom of a reservoir frequently consists of providing artificial respiration and carrying out other measures directed at restoring circulation.

When conducting rescue operations, formation personnel must strictly observe water safety; they must be able to swim well, row and operate water crossing equipment; they must possess skills for water rescue operations and be able to give first aid to victims. Loading water crossing equipment above the established standards /is prohibited/. Formation personnel must wear life vests. During operations in a flooded area, touching wires, switches and other electrical fittings without special protective gear /is prohibited/.

Domestic animals are removed from the flooded area after people are rescued. River boats, ferries, barges and military assault crossing craft are used to remove them.

Dikes and dams are erected and drainage ditches are constructed to protect facilities against flooding; quarry stone is put on top of flooded bridges; ice breakers are erected on bridge abutments; windows and openings in basements and lower floors of buildings are walled up. In other cases, obstructions are blown up, large ice floes are broken up and artificial channels are constructed to reduce the water level and lead water away from the facility.

If the facility is not able to avert the danger of flooding, damage limitation measures are taken. For this purpose, the most valuable equipment is dismantled and raised to high spots using cranes and block and tackle; the foundation and housing of machinery is abundantly greased down with lubricating grease.

All transformer units and removable racks are raised higher than the expected water level. Electrical equipment is cut off since it may short circuit with the current on and cause a fire. All baths, boilers and tanks are filled with water since, if they are not, they may float and damage foundations, walls and equipment. When it is not possible to remove finished products and tools, they are reliably protected in water-proof plastic wrappers and canvas.

3. Methods and Organization for Conducting Rescue and Emergency Recovery Operations During Earthquakes

As a rule, an earthquake appears unexpectedly; it cannot be prevented or predicted. Although the main tremor usually does not last more than several seconds, it may have disastrous consequences. An earthquake is frequently accompanied by fires, floods and cave-ins. The underground rumble, the shaking ground and the cracks in the ground cause fear and panic among people and animals. The earthquake causes destruction to buildings and structures and people may be caught under their debris. Moreover, water pipes are put out of commission; roads and gas systems are destroyed; large-scale power outages may occur in electrical systems; and there may be major industrial accidents.

For all practical purposes, earthquake disaster control hardly differs from the rescue and emergency recovery operations conducted during nuclear strikes. The only difference is that operations will be conducted without radioactive contamination during earthquake operations. However, the large-scale, multiple nature of the damgage to facilities, the possibility that CD formations in the earthquake area will be put out of commission and the psychological shock among people give rise to certain unique aspects in conducting rescue operations during earthquakes.

Rescuing people and physical assets is the primary mission of CD formations during earthquakes. The entire package of rescue and emergency recovery operations is organized based on this mission.

First of all, residents are warned of the earthquake on all available channels. It is announced that everybody should immediately leave their homes and get away from buildings so they won't wind up in the cave-ins. CD formations are put on alert by the alert. Steps are taken to transfer formations from adjacent rayons--which are not subject to the earthquake--to the earthquake areas.

Reconnaissance is organized in the earthquake area. It must: establish the size and borders of the center of destruction; discover fire zones; assess the approximate extent of future rescue and emergency recovery operations; reconnoiter routes which will provide formations access to operational objectives; determine the status of sources of water and the extent of firefighting missions; and enter on a map the areas which have not been touched by the destruction (seismic islands).

Air reconnaissance establishes the size of the earthquake area, its boundaries, large-scale fire zones, the nature of changes in the terrain and the status of pipelines. Ground-based reconnaissance determines the degree of damage to facilities, possible locations of victims and routes for evacuating them; it also determines the methods for conducting future operations and the requirement for bringing in the appropriate equipment and specialists.

It is advisable to send traffic support detachments--composed of obstacle clearing, road and bridge construction and repair and route marking groups--into the earthquake area behind the reconnaissance elements. Then, the main forces, which are designed for earthquake disaster control efforts, are committed; firefighting formations, law enforcement formations, first aid detachments and composite rescue detachments are in the first echelon.

Based on the experience of major earthquake disaster control efforts, the following approximate sequence for rescue and emergency recovery operations in earthquake areas is recommended: providing first aid to victims; organizing firefighting efforts; evacuating children, patients and all victims; looking for injured in cave-ins and conducting operations to rescue them; laying safe routes through cave-ins and ruins; providing security for physical assets and providing law enforcement; organizing emergency recovery operations; and burying earthquake victims and conducting disinfection efforts.

In a number of cases--due to severe damage to buildings, pipelines, roads and bridges and also due to disruption of the water supply--providing aid to the injured and saving the remaining people will have to be conducted under difficult conditions.

Aid to victims usually begins with providing them drinking water and conducting preventive measures against gastrointestinal illnesses. Then, large-scale innoculations are conducted and individual areas are disinfected; this makes it possible to avoid epidemics.

Since the majority of the people who have lived through an earthquake are nervous and afraid of new, destructive tremors, it is advisable to begin evacuating victims as soon as possible, especially children, patients and the aged.

Since fires accompany every earthquake, CD formations and firefighting details should concentrate a significant amount of effort on localizing fires. Moreover, a large-scale fire area must be broken down into parts and the individual pockets must be gradually localized.

The accomplishment of this mission is complicated by the fact that watermains are put out of commission during the earthquake and obstructions, cracks and cave-ins in the streets and on the highways cause natural sources of water to dry up. It is recommended that fire breaks be set up along major highways and streets and around the ruins caused by the earthquake as an effective firefighting measure under these conditions. Under the effect of underground tremors, alleuvial deposits contract and this frequently causes a great deal of mud and water to appear (similar to a mud-laden torrent); this may serve as a barrier strip in the path of a fire.

CD staffs organize command and control of formations participating in earthquake disaster control efforts and they supply them with everything they need. When formations are brought into an earthquake area, they are given their objectives and the time for beginning and completing operations.

At first, there may not be enough forces in the earthquake area to conduct operations; therefore, they should primarily operate at those facilities which are in danger of flooding, being damaged or collapsing. As formations arrive from other areas which were not exposed to the earthquake, the operational front will expand.

Rescue operations in an earthquake area are conducted using the methods set forth in chapters 7, 8 and 9. A unique feature consists of the search for injured. A search is primarily conducted in possible areas of the greatest concentration of people: at movie theaters, stores, industrial buildings and apartments. Since reinforced concrete frame buildings withstand an earthquake better than others, it is better to be inside these buildings during tremors--on the lower floors, in the halls or in basements. Organizing emergency recovery operations in an earthquake area begins with restoring the watermains and power facilities.

The aggressive and purposeful actions of CD formations in cooperation with other forces participating in rescue and emergency recovery operations are a guarantee of success in earthquake disaster control efforts.

At the same time, it is necessary to remember that personnel of CD formations are required to strictly comply with safety measures. During follow-on underground tremors, it is necessary to immediately leave buildings and areas where they may collapse. Shelter must not be taken near open bodies of water due to possible abrupt changes in the water level in them; there should not be any need to come into contact with damaged buildings or unstable structures; movement must only be along reconnoitered routes and roads; discipline must be observed; obstructions must be dismantled with caution; safety must be provided for comrades during operations under difficult conditions, and water must not be taken from untested sources.

Practical experience shows that, to a great extent, success in accomplishing rescue and other operations when working in a large-scale fire and natural disaster area depends upon the morale and political status of formation personnel--their level of discipline, stamina, courage, resourcefulness, mutual assistance and readiness to accomplish the assigned missions at any cost; this, in turn, depends upon the level of party political work organized in formations based on the decisions of the CPSU Central Committee and the Soviet government and the orders and directives of the USSR Minister of Defense and the USSR Chief of Civil Defense.

CHAPTER 14

PLANNING AND KEEPING RECORDS ON CIVILIAN FORMATION TRAINING AND CIVIL DEFENSE TRAINING FOR RESIDENTS

1. Organization and Procedures in Planning Training for Formations and Residents

To a great extent, the achievement of high marks in training civilian formations and all categories of residents on civil defense issues depends upon in-depth, well thoughtout planning of these measures.

Planning training for formations and residents is a complex, creative process which requires CD chiefs and their staffs to have an in-depth knowledge of the principles of defense against weapons of mass destruction and of teaching the psychological principles; it also requires thorough consideration of the level of training of supervisory and command personnel, blue collar workers, white collar employees and kolkhoz workers and it requires detailed consideration of the availability and status of training facilities.

Training for formations and residents at a national economic facility and in the city (rayon) is planned for the entire training year. Planning documents include:

The CD chief's order on training results for formations and residents for the past year and missions for the new training year;

A training plan for formations and residents for the training year;

A CD training plan and schedule for blue and white collar workers by shops, sections and departments (for major national economic facilities, it is developed as an appendix to the training plan);

A lesson plan for all categories of trainees.

In addition, the city and rayon may develop:

A schedule for conducting comprehensive facility exercises;

A schedule for conducting CD measures with school students at Pioneer camps.

Formation and resident training measures make up an individual section of the CD staff's monthly work plan. The following are attached to the staff's annual work plan: thescenario for comprehensive facility exercises, command post exercises, tactical-operational support exercises with formations, staff exercises and topics for lectures and reports on civil defense.

The CD chief organizes all the work for planning formation and resident training measures for the new training year. In order to correctly organize the work and assign missions to his subordinates, he must:

Study the decisions and decrees of higher party and Soviet agencies and appropriate CD chiefs on formation and resident training issues (in addition, for a facility, the instructions on these issues from the ministry [department] to which the facility is subordinate), as well as the training curriculum;

Analyze the results of formation and resident CD training for the past training year;

Listen to suggestions from the CD chief of staff and chiefs of support services (the primary specialists)--and, if necessary, from individual formation commanders--on organizing formation and resident training in the new training year; it is also advisable to listen to the opinion of the party committee (bureau) and the local committee on these issues.

On the basis of this data, the CD chief makes his decision which defines:

The procedures, time periods and subject matter of CD staff training;

The procedures, time periods and subject matter for CD supervisory and command personnel training;

The procedures and time periods for training formation personnel and blue and white collar workers (kolkhoz workers) not included in formations as well as residents under the jurisdiction of the residential sector who are not employed in production or the service sector;

The time periods for conducting CD exercises;

Measures for building and improving training facilities;

Measures for supervising formation and resident training (personal participation, monitoring and providing assistance, evaluating results and other issues);

Party and political support measures for formation and resident training;
Measures to promote CD knowledge;
Deadlines for completing planning on formation and resident training.

Based on the CD chief's decision, the staff, in conjunction with support service chiefs (the primary specialists), develops the CD chief's order on the results of formation and resident training for the past year, missions for the new training year and the training plan.

/The CD chief's order/ must consist of a narrative section and an order section.

The narrative section of the order reflects:
Overall formation and resident training results for the past year--how the instructions of higher CD chiefs and staffs and ministries (departments) were accomplished in these areas; the percentage of people encompassed by the measures conducted and the percentage of trainee accomplishment of the training plan (separately for each category of trainee);
The number and quality of CD exercises conducted; how many blue and white collar workers and kolkhoz workers were drawn into them (as a percentage of the total number of people enrolled in formations);
The shops, sections, teams, formations and support services which achieved the best trainee training results for the past year;
Measures conducted to promote CD knowledge;
The organization and conduct of CD measures with school students at Pioneer camps;
The status of training facilities (what was done in the past year to improve training facilities and how they were used in the training process);
Deficiencies in formation and resident training during the past year; an analysis of their causes with specific examples cited.

The order section assigns missions:
Stemming from the requirements levied by the higher CD chief and staff (in addition, for a facility, levied by the ministry or department) on formation and resident training;
For training each category of trainee separately;
For conducting CD exercises;
For promoting CD knowledge;
For conducting CD measures with school students at Pioneer camps;

For building or improving current training facilities and procedures for using them.

A section on awards for people who achieve the best results in training trainees is also included in this part of the order.

The formation and resident /training plan/ for protection against weapons of mass destruction (a blank form of the plan is shown in Appendix 14 as an example) usually consists of the following sections:

1. /Measures conducted by senior CD chiefs and staffs/. This section sets forth all the measures conducted by senior CD chiefs and staffs, which the facility (city, rayon) may participate in.

2. /Training for supervisory and command personnel/. This section defines the composition and number of training groups for training supervisory and command personnel, the time, location and duration of training and the people responsible for training.

3. /Formation personnel training/. The subject matter of this section stipulates training for general purpose formations and support services formations.

4. /Training blue and white collar workers (kolkhoz workers) not included in formations/. This section indicates the procedures, time and deadlines for training the cited categories of trainees; it establishes deadlines for testing them on standards; it also establishes the procedures for training instructors for the universal, mandatory program for minimal knowledge on CD.

5. /Training residents not employed in production and services/. This section defines the organization, procedures and people responsible for training unemployed residents.

This section is included in the plan at national economic facilities when there is a residential sector under the department's jurisdiction.

6. /Conducting CD measures with school students at Pioneer camps/. Provisions are made to provide CD training to employees of Pioneer camps (camp supervisors and pioneer leaders) and also to organize CD measures with school students (military games, contests, relay races, quizzes, etc.).

This section is included in the plan at national economic facilities if they have their own Pioneer camps.

7. /Conducting CD exercises/. This section includes the time periods for conducting the following exercises and the exercise themes: set piece exercises, experimental research exercises, command post exercises, tactical-operational support exercises, comprehensive facility exercises and also staff training.

8. /Measures for promoting CD knowledge/. This section includes: promotional efforts via publications; using radio and television broadcasts, movies, oral promotions (reports and discussions) and other measures to promote CD knowledge.

9. /Training facilities and measures for improving them/. This section must provide a detailed exposition on building or improving the equipment for CD training areas, full-scale training areas, training sites and training centers. Other measures related to construction of training facilities are also discussed.

10. /CD training assistance and monitoring./ This section specifically indicates where, when and who monitors formation and resident training and where, when and who provides assistance for various measures to achieve a high level of training for trainees.

2. Keeping Records and Reports on Formation and Resident Training

Well-kept records and reports play an important role in setting up the training process for trainees.

Records must be timely and comprehensive and they must objectively reflect all the measures conducted.

The facility, city and rayon CD staffs must keep records on lessons for all categories of trainees and records on the exercises, staff training sessions and CD contests conducted; in addition, the facility CD staff must keep records on formation training and individual training records on supervisory and command personnel who attend training outside the facility (at CD courses and at advanced courses at educational institutions); and the city and rayon CD staffs must keep training records on appropriate city and rayon CD supervisory personnel.

At large facilities, records may be kept by shops, sections and departments.

The responsibility for keeping formation and resident training records is assigned to CD chiefs of staff and to the people conducting lessons.

Formation and resident training reports are made according to the schedule of routine reports. They must precisely reflect the status of trainee training for the reporting period.

The foundation of the reports is reliable, quantitative data in the format of the reporting documents and a brief written report which usually covers:

The organizational measures conducted before the beginning of the training year and their effectiveness;

The overall status of the facility's (city's, rayon's) training for formations and residents;

The facilities, branches, sections, teams and formations which attained the best scores for training trainees during the training year;

A brief description of CD exercises conducted, positive aspects and deficiencies;

The status of training facilities and their utilization to provide quality training to formations and residents;

The status and effectiveness of efforts to promote CD knowledge and the forms and methods used; numbers of blue and white collar workers (kolkhoz workers) encompassed by the measures conducted;

The primary deficiencies in training formations and residents and an analysis of their causes;

Overall conclusions, suggestions and desires directed at improving formation and resident training.

CHAPTER 15

PREPARATIONS AND METHODS FOR CONDUCTING TACTICAL-OPERATIONAL SUPPORT, COMMAND POST AND COMPREHENSIVE FACILITY EXERCISES

1. Purposes and Nature of CD Exercises Conducted at National Economic Facilities

CD exercises conducted at national economic facilities are divided into tactical-operational support exercises with CD civilian formations, command post exercises and comprehensive facility exercises. Based on their purposes, they are scheduled, inspection, set piece and experimental exercises.

/Tactical-operational support exercises/ are conducted during the final phase of formation training and they test a formation's readiness to accomplish missions in centers of destruction (contamination), in large-scale fire areas, in natural disaster areas and at the sites of major industrial accidents.

During the tactical-operational support exercise, primary attention is directed at uniting a formation into a single body capable of accomplishing missions on its own or in coordination with other formations and military units (elements). During the tactical-operational support exercise, formation personnel are trained in the hands-on accomplishment of their duties; they work on the problems of coordination among elements within the formation and also on problems of command and control of formations when accomplishing missions in a difficult situation; command personnel receive practice in commanding subordinates.

At least eight hours are allocated for a tactical-operational support exercise.

The corresponding CD chief, chief of staff or general-purpose formation

commander is assigned as the general-purpose formation (territorial or facility) tactical-operational support exercise director; for support service formations, the appropriate chief of the support service to whom the formation is directly subordinate is assigned as the exercise director. Depending on the exercise theme and the nature and extent of problems being worked out, support service formations may be used in a general-purpose formation tactical-operational support exercise.

/Command post exercises/ are conducted with facility CD command and control elements for joint training of facility CD chiefs, staffs and support services.

Command post exercises are conducted using communications facilities--and, when necessary, using individual formations--so that command personnel can acquire the skills of commanding and controlling CD forces and facilities. They are conducted under the supervision of facility CD chiefs.

The duration of command post exercises is 1-2 days.

/Comprehensive facility exercises/ are the primary method of training facilities as a whole, their command and control elements, command personnel, CD formation personnel and also residents who do not belong to a formation but who are being used for the exercises.

The essence of the comprehensive facility exercise consists of the fact that, as a rule, all facility command personnel, staff personnel, support service personnel, the maximum number of facility formations and the majority of blue and white collar workers (kolkhoz workers) who do not belong to formations function in the exercise according to a single plan and under the same situation. If the facility has its own housing available, the residents (teenage students and citizens not employed in production or services) are drawn into the exercise. During the exercise, the entire package of missions is accomplished without shutting down production activities.

During the comprehensive facility exercise, favorable conditions are created for organizing and implementing coordination and command and control and also for joint training of various categories of trainees. During the exercise, the entire package of missions is worked out as completely as possible and the degree of the facility's GD readiness is brought to light.

The training facilities for a comprehensive facility exercise are the facility itself, its territory, buildings, protective structures, lines of communication, the special features of

its location, the specific production activities intrinsic to it and also the facility's zone in the countryside.

The overall duration of a facility exercise is up to 3 days.

Due to the large number of measures in organizing comprehensive facility exercises and the complexity in conducting them, it is recommended that they be conducted once every three years.

At major enterprises, the exercise may be conducted in two or several phases. Part of the shops, departments and formations are used in one phase of the exercise; other shops, departments and formations subsequently participate in the exercise.

As a rule, the facility CD chief is the comprehensive facility exercise director. Senior CD chiefs and officials of the appropriate ministries, departments and industrial associations conduct experimental, set piece and--as a means of monitoring the CD status--part of the scheduled comprehensive facility exercises.

Deputy and assistant directors are assigned to prepare and conduct the comprehensive facility exercise and an exercise staff or exercise control group is also set up.

The higher-echelon CD element establishes the themes for tactical-operational support exercises, command post exercises and comprehensive facility exercises. They may be adjusted by exercise directors based on the special features of the facilities.

As a rule, comprehensive themes--including the entire range of the majority of the problems in conducting CD at a facility--are provided for comprehensive facility exercises and command post exercises. For example, the theme of a comprehensive facility exercise for an industrial enterprise could be: "Carrying out CD measures at an enterprise at the threat of an enemy attack and while conducting rescue and emergency recovery operations." The topic of a command post exercise for the same facility could be: "Work of the enterprise CD chief, staff and support services in implementing protective measures within short deadlines and conducting rescue and emergency recovery operations in a complex, fluid situation."

Narrower themes are selected for tactical-operational support exercises. Thus, the theme of a tactical-operational support exercise for a rescue detachment could be: "The rescue detachment's rescue and emergency recovery operations in a center of nuclear destruction."

Exercise goals are determined based on the exercise theme and the nature, makeup and training level of trainees. Both general and specific goals are established for each exercise; training problems which reveal the subject of the exercise theme are also established.

Each exercise is conducted against the background of a specific situation which approximates actual conditions as much as possible.

Comprehensive facility exercises and command post exercises are divided into phases. This requirement is caused by the following:

--This division corresponds to a phased development of events which may develop in an actual situation;

--Dividing exercises into phases makes it possible to better concentrate attention on accomplishing the specific missions of each phase.

Each phase of an exercise must have a logical conclusion and it must encompass the activities of all categories of trainees at the threat of an enemy nuclear attack, post-attack, etc. For example, when working out the theme "Conducting CD at a facility during the threat of an enemy attack and after a nuclear strike," the phases could be: 1st phase--"Accomplishing CD measures at a facility at the threat of an enemy attack"; 2nd phase--"Organizing and conducting the dispersal of facility blue and white collar workers and evacuating members of their families to the countryside"; and 3rd phase--"Organizing and conducting rescue and emergency recovery operations."

2. Exercise Preparations

Exercise preparations include: developing the documents on organizing and conducting the exercise; preparing the exercise control staff--theoretical lessons, briefing sessions, studying functional duties, assistant directors develop specific plans, reconnaissance of the exercise area and playing the exercise with the control staff; preparing trainees--studying the parts of the facility CD plan concerning them, theoretical and applied lessons with supervisory and command personnel, bringing formation manning and equipment up to strength, conducting applied lessons with trainees; preparing materiel and facilities, including the exercise area, especially the full-scale exercise areas and the simulation equipment.

The following administrative and methods documents are developed to support preparations for a comprehensive facility exercise or a command post exercise and to ensure it is conducted well:

a chronological exercise preparation plan; administrative instructions for preparing and conducting the exercise; a plan for conducting the exercise and a situation overlay (map); a plan for political work; individual plans for deputy and assistant exercise directors; an exercise support plan (materiel, equipment, communications, simulation, provost marshal, etc.): and instructions on safety measures during the exercise.

The following are developed in preparing for and conducting a tactical-operational support exercise: a chronological plan; administrative instructions; a plan for conducting the exercise; individual plans for deputy and assistant exercise directors and for the chiefs of support services; a simulation plan and other required documents.

/The chronological exercise preparation plan/ establishes the basic measures for exercise preparations, their sequence, deadlines for accomplishing them and individuals responsible for execution. It usually includes a list of administrative areas in preparing and conducting an exercise, procedures for developing documents, preparations for exercise control elements, command personnel preparations, civilian formation preparations, and preparations for the exercise area.

The plan is developed and signed by the chief of the exercise control staff and approved by the exercise director.

/Administrative instructions/ for exercise preparations are developed in the form of an order (instruction). They usually establish: exercise goals and deadlines; exercise participants and procedures for preparing them for the exercise; procedures for preparing and using equipment and property during the exercise; materiel and equipment support problems; deadlines and amount of work required to prepare training areas, full-scale training areas, simulation areas, the manpower and resources allocated for these purposes and responsible officials; measures to protect state, cooperative, kolkhoz and the citizens' personal property in the exercise area; safety measures during the exercise and other issues.

/The plan for conducting the exercise/ is the basic document which defines the course of the exercise, procedures and sequence for working out training problems with trainees by exercise phases. The plan covers: the title of the exercise theme; participants used in the exercise; training goals for each category of trainee and time for conducting the exercise; exercise phases, their duration, training issues and the time for working out each of them; the initial situation, force grouping and location of command posts and the time for completing the exercise and conducting a critique.

The course of the exercise is written up in phases and takes the form of a detailed table of graphs: time, training problems, situation (the content of tactical problems) and situation simulation, actions of the director and his deputies and assistants and expected trainee actions. The Expected Trainee Actions graph can be broken down into several graphs according to the number of primary categories of trainees.

/The plan for political work/ makes provisions for inculcating a spirit of unlimited devotion to the CPSU and the Soviet government in trainees and for increasing each participant's personal responsibility for successfully accomplishing the missions assigned for the exercise.

/The individual plans/ for deputy and assistant exercise directors are developed as a narrative or as overlays. They usually indicate: the exercise theme, training goals for the appropriate formations (categories of trainees); exercise phases, their content, duration and training problems; the composition of formations and the number of blue and white collar workers, kolkhoz workers and other categories drawn into the exercise; the situation for the exercise phases and the situation for working out each of the training problems and also the time planned for this purpose; procedures for the deputy (assistant) director's work, time, place and methods for building up the situation; possible decisions of commanders (chiefs) and actions of various categories of trainees; necessary estimates; command and control signals and deadlines for submitting reports to the director.

Other issues may also be reflected in the individual plans.

/The materiel support plan/ makes provisions for supporting all measures conducted during the exercise with all the materiel and equipment required to accomplish the exercise missions.

/The simulation plan/ is developed in narrative form with overlays as appendices. It provides: simulation objectives, types and times; manpower and resources allocated to carry out simulation operations; responsible officials; communications and warning signal facilities for simulation; security measures for simulation sites and safety measures.

Conventional signs are used to mark the locations of simulated contaminated areas, fires, obstructions, destruction, damage to public utility systems, obstructed protective structures, etc., on the overlay.

/The communications overlay/ shows command posts and communications centers, facilities and channels actually deployed for the exercise and it also provides an estimate of communications manpower and facilities.

In addition to developing documents, other important measures are also conducted when preparing comprehensive facility exercises. Thus, during the training year within which the exercise will be conducted, the training of formations and blue and white collar workers (kolkhoz workers) at the facility must be primarily directed at preparing for the exercise. For this purpose, primary attention is devoted to applied lessons when conducting lessons with blue and white collar workers (kolkhoz workers) on the universal, mandatory program of minimal knowledge on CD; to make formations more cohesive, tactical-operational support lessons and exercises based on basic themes are conducted with their personnel; staff training sessions and command post exercises are conducted with supervisory and command personnel.

Preparing the simulation and setting up full-scale training areas are especially labor intensive. The goal of simulation is to create the psychological feeling of a real situation; in addition, the trainees acquire practical skills in organizing and conducting rescue and emergency recovery operations under the simulated conditions of destruction, obstructions and fires. Preparing the full-scale training area includes: creating obstructions over blast shelters, basements, in destroyed parts of buildings and in passageways; simulating fires, positioning mock "injured"; simulating damage to water mains, sewage systems, power and gas supply systems and other pipelines as well as the facility's industrial components which may cause obstruction by secondary means (posionous gas leaks, combustion of inflammable substances, etc.); and marking contaminated areas.

Basements are used to simulate obstructed blast shelters. Fuel by-products, smoke pots and grenades are used to simulate fires. Special groups of people are briefed and assigned as mock injured; moreover, each of them is issued a small card (a simulated chit) containing data on the nature and severity of the prearranged injury.

3. Conducting the Exercise

A comprehensive facility exercise or command post exercise usually begins with the transmission of a warning signal or order--which initiaties the beginning of the exercise and the assembly of facility CD supervisory personnel--to the facility.

To create a situation which approximates an operational one as much as possible, the warning and assembly must be conducted according to the plan.

During the warning and assembly of CD supervisory personnel, the exercise director and his deputies and assistants monitor the realism of the warning system and the timeliness of the supervisors' arrival.

After the order is issued to implement the CD plan, the exercise director and his deputies and assistants listen to the orders and instructions of the CD chief of staff, the chiefs of support services and other facility supervisory personnel; they monitor the organization and accomplishment of measures and operations stipulated by the CD plan. Moreover, primary attention is devoted to organizing--and during a comprehensive facility exercise, to the actual accomplishment of these measures--shelter for blue and white collar workers (kolkhoz workers) in protective structures, preparing the facility to transition to a different operating mode and increasing its operational stability, issuing individual protective gear and evacuation arrangements.

To ensure shelter for blue and white collar workers (kolkhoz workers) in protective structures, occupied structures are cleared out and they are put in complete readiness to receive people being sheltered and actual construction to meet the shortage of protective structures is organized. Residents are used to construct improvised protective structures and to modify various underground buildings as shelters.

Work on the problems of conducting evacuation measures begins when the exercise director issues the order to disperse facility blue and white collar workers and to evacuate members of their families. During this period, the exercise director and his deputies and assistants monitor the organization and actual implementation of warning for blue and white collar workers of the on and off-duty shifts and of members of their family; they also monitor the deployment and operations of the evacuation assembly center, preparations of all types of transportation, organization of the provost marshal service and the removal (by vehicle or on foot) of blue and white collar workers and members of their families to the countryside.

When working out the problems of rescue and emergency recovery operations, primary attention is devoted to organizing reconnaissance and continually conducting it, the timely arrival of formations in a center of destruction, a march-route column formation consistent with the actual situation, coordination

among formations when conducting operations and also to organizing reliable command and control of formations.

When an Air Raid alert is declared during a comprehensive facility exercise, the exercise director and his deputies and assistants monitor the transmission of the signal and its delivery to on-and-off duty shifts and to residents of apartments within the facility's jurisdiction; they monitor the actual implementation of measures to shelter exercise participants in protective structures and they monitor measures for the trouble-free shut-down of production.

A tactical-operational support exercise usually begins with an assembly of exercise participants and an inspection of their readiness. After this, the exercise director briefs formation commanders on the situation and assigns them missions (issues an order). The director and his deputies and assistants subsequently monitor how the formation commanders organize their operations and they monitor the actions of their subordinate personnel.

During all types of exercises, the exercise director must take steps so that training problems are worked out in sequence and in an instructive manner and so that they achieve practical results.

The director and his deputies and assistants must exert an active influence on the course of the exercise by continually building up the situation and they must strive for a situation where supervisory and command personnel continually exercise command and control over all measures according to the CD plan and over the actions of formations when rescue and emergency recovery operations are being conducted.

During the exercise, the situation is built up by issuing tactical problems and transmitting various information and orders from the higher headquarters. The situation must be instructive, complex and fluid; it must require rapid, bold decision making, decisive actions by commanders and other personnel and accomplishment of missions within short deadlines and with a maximum exertion of effort. The situation must build up due to the results of organized reconnaissance or the actions of other formations, as well as by personal observation, requirements, etc.

The situation created during the exercise must develop aggressiveness, initiative and endurance in all participants; it must inculcate habits of remaining and working in protective gear for an extended period; it must teach command personnel to skillfully organize operations under conditions of severe destruction, fires

and widespread contaminated zones and it must stimulate them to search for more efficient procedures when conducting rescue and emergency recovery operations.

Exercise control personnel should not undermine the initiative of trainees or impose their decisions on them. Incorrect actions must be corrected in such a manner that the trainees will be able to intelligently analyze the mistakes made on their own, understand their consequences and operate in accordance with the current situation.

If a decision does not meet the current situation, the director and his assistants channel the trainees to make the correct decision with additional tactical problems.

A great deal of attention is devoted to complying with safety measures when conducting facility exercises and tactical-operational support exercises. For this purpose, the following /are prohibited/ during exercises: transporting personnel and equipment on motor vehicles which are not modified or on railway cars (flats) and ships which are not prepared; deploying radio and radio relay stations closer than 100 m from high voltage lines and moving under these lines with raised antennas; exploding mines and lighting smoke pots closer than 50 m from personnel and highly flammable materials; exploding various simulated charges, unexploded battle-noise simulators and fuses by personnel who have not been trained for this work and who have not been assigned to do it; lighting bonfires in populated areas, in woods with a large amount of dry brush wood and in steppe areas with dried out vegetation.

The critique is the concluding phase of an exercise. A well-prepared and well-conducted exercise critique has a great deal of educational value. During the critique, the trainees conduct a more in-depth assessment of the valadity, significance and accuracy of their decisions and actions consistent with the situation and also according to the analysis, comments and assessment of the exercise director.

The critique usually gives an account of: the exercise theme, its participants, training goals, special features of the exercise, the theoretical propositions underlying it, the initial situation and the mission assigned to trainees; an analysis and assessment of the basic decisions and actions by exercise phases (their compliance with the missions received and the situation), the analysis is supported by an appropriate diagram; individual assessments and comments on the operations of CD staffs and support services and various types of formation support and action; an overall rating of the exercise results; and specific tasks to eliminate deficiencies uncovered during the exercise.

A lot of effort is required to prepare the critique and skillfully conduct it within short deadlines. Practical experience shows that it is advisable to give officials of the exercise control staff an outline of the critique ahead of time to prepare for the critique so that they will understand what type and amount of material is required for the critique.

The following should be taken into account when preparing and conducting a critique: the ratings and comments included in it must be substantiated; the most typical examples of general and specific deficiencies as well as examples of positive actions with specific individuals indicated must be shown.

In addition to the overall critique, assistant exercise directors conduct individual exercise critiques with the support services and formations where they served as exercise control officials.

Based on the results of the exercise, the facility issues an exercise order which provides: the overall results of the exercise; measures for rewarding exercise participants who distinguish themselves; and tasks for eliminating the deficiencies discovered during the exercise.

9001

APPENDICES

Appendix 1

Values for 50 Percent Attenuation Layers of Selected Construction Materials (for gamma radiation in the path of a nuclear cloud)

(1) Материал	Плотность, г/см³ (2)	Слой половинного ослабления, см (3)
(4) Древесина	0,7	21,0
(5) Стекло	1,4	10,0
(6) Насыпной грунт	1,6	8,4
(7) Глина	1,6	8,4
(8) Кирпичная кладка	1,6	8,4
(9) Бетон	2,3	5,6
(10) Железобетон	2,5	5,4
(11) Сталь	7,8	1,8

Key:

1. Material
2. Density, in g/cm^3
3. 50 percent attentuation layer, in cm
4. Wood
5. Glass
6. Dirt fill
7. Clay
8. Brick masonry
9. Concrete
10. Reinforced concrete
11. Steel

Appendix 2

Tables for Determining Protective Filtration Mask Face Section Sizes

1. Для определения размера шлем-маски к противогазу ГП-5

(3) Результаты измерения головы, см	(4) Размер шлем-маски
(8) До 63	0
63,5—65,5	1
66,0—68,0	2
68,5—70,5	3
71,0 и более (9)	4

2. Для определения размера маски к детским противогазам

(5) Высота лица, мм	(6) Ширина лица, мм	(7) Размер маски
(8) До 77	До 108	1
77—85	108—116	2
85—92	111—119	3
92—99	115—123	4
99 и выше (9)	124—135	5

Note: The first four mask sizes usually include the CPM-6m protective mask sets and the fifth size usually includes the CPM-6 protective mask set.

Key:

1. To determine the size of the helmet mask for the CP-5 protective mask
2. To determine mask size for children's protective masks.
3. Head measurements, in cm.
4. Helmet mask size.
5. Face length, in mm
6. Face width, in mm
7. Mask size
8. Up to
9. And higher

Appendix 3

Team _____ Dosimeter Reading Record

(1) Фамилия и инициалы	(2) № дозиметра	(3) Время облучения: (4) начало	(3) Время облучения: (5) конец	(6) Доза, Р	(7) Дата снятия показаний дозиметра	(8) Примечание

(9) Дозиметрист _____ (подпись) (10)

Key:

1. Name and initials
2. Dosimeter No.
3. Exposure time
4. Beginning
5. End
6. Dose, in R
7. Dosimeter reading date
8. Notes
9. Dosimeter operator
10. (Signed)

Appendix 4

Team _____ Radioactive Exposure Log

(1) Наименование должности	(2) Фамилия и инициалы	(3) Дата начала облучения	(4) Доза облучения нарастающим итогом по датам измерения, Р		

(5) Начальник команды _____ (подпись) (7)

(6) Дозиметрист _____ (подпись) (7)

Key:

1. Position title
2. Name and initials
3. Initial exposure date
4. Cumulative exposure dose by measurement dates, in R
5. Team leader
6. Dosimeter operator
7. (Signed)

157

Appendix 5

Composite Record of Team _____ Radioactive Exposure Status on _____

(1) Формирование	(2) Списочная численность	(3) Численность личного состава, подвергшегося облучению				
		(4) Всего	(5) в том числе дозами, Р			
			1—50	51—100	101—150	151—200
(4) Всего ...						

(6) Начальник команды _____ (подпись) (7)

Key:

1. Formation
2. Personnel on hand
3. Number of personnel exposed
4. Total
5. Including, with dosages, in R
6. Team leader
7. (Signed)

Appendix 6

Tentative Values of Δp_ϕ Shock Wave Overpressure in kg/cm^2 Causing Varying Degrees of Destruction to Facility Components

(1) Элементы объекта	(2) Степень разрушения		
	(3) слабое	(4) среднее	(5) сильное
(6) Массивное промышленное здание с металлическим каркасом и крановым оборудованием грузоподъемностью 25—50 т	0,2—0,3	0,3—0,4	0,4—0,5
(7) Промышленное здание с металлическим каркасом и сплошным легким заполнением стен и крыш	0,1—0,2	0,2—0,3	0,3—0,4
(8) Многоэтажный кирпичный дом	0,08—0,1	0,1—0,2	0,2—0,3
(9) Здание фидерной и трансформаторной подстанции из кирпича или блоков; водонапорная башня	0,1—0,2	0,2—0,4	0,4—0,6
(10) Одноэтажное складское помещение с жестким металлическим каркасом и стеновым заполнением из листового металла	0,07—0,10	0,10—0,15	0,15—0,25
(11) Деревянный дом	0,06—0,08	0,08—0,12	0,12—0,20
(12) Остекление обычное	—	0,01—0,015	0,015—0,03
(13) Наземные резервуары для горючих и смазочных материалов	0,15—0,2	0,2—0,3	0,3—0,4
(14) Частично заглубленные резервуары	0,1—0,3	0,3—0,5	0,5—1
(15) Трубопроводы на металлических (железобетонных) эстакадах	0,2—0,3	0,3—0,4	0,4—0,5
(16) Автомобили	0,1—0,2	0,2—0,3	0,3—0,5
(17) Железнодорожные вагоны и цистерны	0,2—0,4	0,4—0,6	0,6—0,9
(18) Подвальное помещение	0,2—0,3	0,3—0,5	0,5—0,7
(19) Простейшее укрытие (перекрытая щель)	0,3—0,4	0,4—0,6	0,6—0,9

Key:

1. Facility component
2. Degree of destruction
3. Slight
4. Average
5. Severe
6. Large industrial building with a metal frame and a crane installation with a 25-50 ton capacity.
7. Industrial building with a metal frame and compact, light-weight walls and roof
8. High-rise apartment building
9. Brick or block feeder or substation building; water tower
10. Single-story warehouse with rigid metal frame and sheet-metal walls
11. Wooden house
12. Ordinary glass
13. Above-ground POL tanks
14. Partially buried tanks
15. Pipelines on metal (reinforced concrete) trestles
16. Motor vehicles
17. Railway cars and tank cars
18. Basement, facilities
19. Improvised shelter (covered hole)

Appendix 7

Magnitude of Light Pulses Causing Ignition of Certain Combustibles

(1) Материалы	(2) Световой импульс, кал/см²
(3) Обрывки бумаги, стружки, солома	3—5
(4) Сухая гнилая древесина, обтирочные материалы, хлопчатобумажная ткань темных цветов	8—10
(5) Деревянная обшивка зданий, толь кровельный, тенты из хлопчатобумажной парусины	10—12
(6) Хлопчатобумажные драпировки и обивочный мебельный материал	15—17
(7) Тенты из прорезиненной парусины	25—30
(8) Шерстяные обивочные материалы, ковры и обивка сидений автомобилей	30—35
(9) Доски сосновые (еловые) после распиловки	42—50

Note: The values for the light pulses indicated correspond to the most probable yield of nuclear weapons used against rear-area objectives.

Key:

1. Material
2. Light pulse, in cal/cm^2
3. Scraps of paper, shavings, hay
4. Dry rotten wood, polishing materials, dark-colored cotton fabrics
5. Wooden building trim, tar roofing paper, cotton canvas tents
6. Cotton drapes and upholstery
7. Rubber-treated tarpaulin tents
8. Woolen upholstery, rugs and automobile seat covers
9. Pine (fir) boards after sawing

Appendix 8

Mean Values of Radiation Attenuation Factors for Buildings (Structures) and Transportation Facilities

(1) Здания (сооружения) транспортные средства	(2) Коэффициент ослабления K
(3) Производственные одноэтажные здания (цехи)	7
(4) Производственные и административные здания с большой площадью остекления	6
(5) Каменное одноэтажное строение	10—13
(а) Подвал такого строения	37—50
(6) Каменное двухэтажное строение	15—20
(а) Подвал такого строения	100—130
(7) Каменное трехэтажное строение	20—33
(а) Подвал такого строения	400—600
(8) Каменное пятиэтажное строение	27—50
(а) Подвал такого строения	400—600
(9) Перекрытая щель	40—50
(10) Автомобили, автобусы, троллейбусы, трамваи	2
(11) Грузовые вагоны	2
(12) Пассажирские вагоны	3
(13) Кабины бульдозеров и экскаваторов	4

Key:

1. Building (structure), transportation facility
2. Attenuation factor K
3. Single-story industrial building (shop)
4. Industrial and administrative buildings with a large glassed-in area
5. Single-story, stone building
   a. basement
6. Two-story, stone building
   a. basement
7. Three-story, stone building
   a. basement
8. Five-story, stone building
   a. basement
9. Covered hole
10. Cars, buses, trolley buses, trolleys
11. Freight cars (rwy)
12. Passenger cars (rwy)
13. Bulldozer and excavator cabs

Appendix 9

APPROVED
Civil Defense Chief
_____Rayon, City X
_____(Signed)
_____197__

Civil Defense Reconnaissance Plan for
Rayon _____ of City X
(Form)

Reconnaissance Goals: 1. Insure continual observation of NBC contamination.

2. Obtain timely, reliable and complete data on the situation which has developed due to the enemy's employment of weapons of mass destruction, in natural disaster areas and at sites of industrial accidents.

(1) Силы и средства разведки

(2) Наименование штабов ГО (служб, объектов)	(3) Общая разведка			(7) Специальная разведка (службы ГО)							
	(4) комплексные пункты опорной сети	(5) РГ районов	(6) РГ объектов	(8) посты радиационного и химического наблюдения	(9) группы радиационной и химической разведки	(10) группы инженерной разведки	(11) группы пожарной разведки	(12) группы медицинской разведки	(13) группы эпидемиологической разведки	(14) звенья ветеринарной разведки	(15) звенья фитопатологической разведки

(16) Сроки приведения сил и средств разведки в полную готовность

(17) Задачи (объекты) разведки и порядок их выполнения

(18) Задачи (объекты) разведки	(19) Силы и средства разведки для выполнения задач	Сроки выполнения задач (20)		(23) Порядок доклада о результатах разведки и доведения развединформации
		(21) начало	(22) конец	

(24) 1. При внезапном нападении противника

(25) 2. При планомерном выполнении задач ГО

(26) а) При возникновении угрозы нападения противника

(27) б) После нападения противника

(28) 3. При стихийных бедствиях, крупных производственных авариях

(29) Резерв сил и средств разведки: 1._____

2._____

Начальник штаба ГО_____района (30)

_____ (31)
(подпись)

"____"_____197__г.

Key:

1. Reconnaissance forces
2. Title of CD staffs (support services, facilities)
3. General reconnaissance
4. Integrated defensive system centers
5. Area reconnaissance
6. Facility reconnaissance
7. Special reconnaissance (CD support services)
8. Radiation and chemical observation posts
9. Radiation and chemical reconnaissance groups
10. Engineer reconnaissance groups
11. Fire reconnaissance groups
12. Medical reconnaissance groups
13. Epidemic-control reconnaissance groups
14. Veterinary reconnaissance teams
15. Plant pathology reconnaissance teams
16. Deadlines for putting reconnaissance forces on full alert.
17. Reconnaissance missions (objectives) and procedures for accomplishing them
18. Reconnaissance mission (objective)
19. Reconnaissance forces to accomplish the mission
20. Deadline for mission accomplishment
21. Begin
22. End
23. Procedures for supporting reconnaissance results and delivering recce information
24. During an enemy surprise attack
25. While accomplishing CD missions according to plan
26. During the threat of an enemy attack
27. After an enemy attack
28. During natural disasters and major industrial accidents
29. Reconnaissance reserve forces
30. CD chief of staff _____Rayon
31. (Signed)

Appendix 10

Excavator Performance Specifications

(1) Марка экскаватора	(2) Емкость ковша, м³	(3) Наибольший радиус копания, м	(4) Производительность в забоях, м³/ч	
			(5) прямая лопата	(6) обратная лопата
Э-255	0,25	4,5	15—20	20—30
Э-302	0,30	6	20—30	30—40
Э-505	0,50	8	40—50	50—60

Key:

1. Excavator make
2. Scoop capacity, in m^3
3. Maximum digging radius, in m
4. Efficiency in obstructions, in m^3/hr
5. Front blade
6. Rear blade

Appendix 11

Vehicle-Mounted Crane Performance Specifications

(1) Марка крана	(2) Грузоподъемность, т	(3) Длина стрелы, м	(4) Скорость, км/ч	(5) Производительность, т/ч
(6) К-32 на ЗИЛ-150	3	6,8	35—40	15—20
(7) К-51 на МАЗ-200	5	7,8	20—35	25—30
(8) К-104 на ЯАЗ-210	10	10	30	35—40
(9) К-124 на пневматическом колесном ходу	12	20	10	40—50

Key:

1. Crane make
2. Load capacity, in t.
3. Arm length, in m
4. Speed, in km/hr
5. Efficiency, in t/hr
6. K-32 on a ZIL-150
7. K-51 on a MAZ-200
8. K-104 on a YAAZ-210
9. K-124 on a pneumatic wheeled carriage

Appendix 12

Pneumatic Tool Performance Specifications

(1) Марка инструмента	(2) Вес, кг	(3) Рабочее давление, ат	(4) Глубина бурения, мм	(5) Скорость бурения, мм/мин	(6) Число ударов в минуту
(7) Бурильный молоток РП-17	17,5	5	400	110—160	—
(8) Отбойный молоток ОМСП-5	9,5	4	—	—	75
(9) Отбойный молоток МО-10	10	5	—	—	50

Key:

1. Brand
2. Weight in kg
3. Operating pressure, in technical atmospheres
4. Drilling depth, in mm
5. Drilling speed, in mm/min
6. Number of strokes per min
7. RP-17 hammer drill
8. OMSP-5 drill
9. MO-10 drill

Appendix 13

Information on Liquid-Fuel Torch

(1) Показатель	(2) № внутреннего мундштука (сопла)			
	1	2	3	4
(3) Толщина разрезаемой стали, мм	20	20—50	50—100	100—200
(4) Расход кислорода, $м^3/ч$ работы	5,4—7,6	7,6—9,8	9,8—20,2	20,2—32,6
(5) Расход керосина, кг/ч работы	0,7—0,8	0,8—0,9	0,9—1,1	1,1—1,3
(6) Скорость резания, мм/мин	300—450	150—300	100—150	75—100

Key:

1. Index
2. Number of internal jets (nozzles)
3. Thickness of steel being cut, in mm
4. Oxygen use, m^3/hr of operation
5. Kerosene use, kg/hr of operation
6. Cutting speed, in mm/min

Appendix 14

Plan for Training Civilian CD Formations and Facility Blue and White Collar Workers in Defense Against Weapons of Mass Destruction for the _____Training Year (Form)

„УТВЕРЖДАЮ" (1)
Начальник ГО объекта (2)
_____
„_____"_____197--г.

ПЛАН (3)
ПОДГОТОВКИ НЕВОЕНИЗИРОВАННЫХ ФОРМИРОВАНИЙ ГО И ОБУЧЕНИЯ РАБОЧИХ И СЛУЖАЩИХ ОБЪЕКТА ЗАЩИТЕ ОТ ОРУЖИЯ МАССОВОГО ПОРАЖЕНИЯ
В_____ УЧЕБНОМ ГОДУ

(Форма)

(4) № по пор.	(5) Наименование проводимых мероприятий и категории обучаемых	Общая численность. Количество привлекаемых	(7) Планируется обучить в году	(8) Продолжительность обучения: дни/час	(9) Сроки проведения (10) октябрь	ноябрь	декабрь	январь	февраль	март	апрель	май	июнь	июль	август	(10) сентябрь	(11) Кто проводит	(12) Кто привлекается	(13) Отметка о выполнении

Начальник штаба ГО объекта_____ (14)

(15) Согласовано:
(16) Секретарь парткома _____
(17) Председатель месткома _____

(18) Примечание. Аналогичный план составляется в колхозе (совхозе).

Key:
1. Approved
2. Facility CD chief
3. (See above title)
4. No, sequential
5. Title of measure being conducted and trainee category
6. Total strength. Number used
7. Planned training during the year
8. Duration of training, days/hrs
9. Times for carrying out measure
10. October thru September
11. Who will conduct the measure
12. Who will be enlisted for the measure
13. Note on accomplishment
14. Facility CD chief of staff
15. Coordinated with:
16. Party committee secretary
17. Local committee chairman
18. Note: A similar plan is drawn up at the kolkhoz (sovkhoz).

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CSO: 8144/1805

END